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AUGUST 17, 1998 VOLUME 15, NUMBER 33

NetworkWorld

THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING

EDI still kicking PAGE 8.

RBOCs vow 1999 will be DSL's year

By Tim Greene

Long berated as foot draggers in the race to offer high-speed digital subscriber line services, the big regional phone companies are making noises that 1999 will be *the* year for DSL.

Here's what you can expect from the RBOCs next year:

- BellSouth will offer DSL that is faster than T-1 but slower than T-3. The offering will come with guaranteed quality of service for ATM over DSL.
- Bell Atlantic will launch DSL services that boast various service levels and support multiple destinations rather than

See **DSL**, *page 10*

Get more online:

- **Details of issues stalling DSL deployment, from incompatibility woes to AM radio interference.**

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Big ISPs play VPN catch-up

By Denise Pappalardo

If you think choosing one of the big ISPs is the safe way to get the latest and greatest in virtual private network (VPN) services today, you're mistaken.

Smaller, lesser-known national ISPs are showing they're more nimble than their giant counterparts and are already supporting some of the latest twists in VPN technologies. Companies such as Concentric Network, Epoch Internet and TCG CERFnet have deployed new tunneling capabilities, digital certificates and other

See **ISP**, *page 12*

Merrill Lynch embraces IP

By Jim Duffy
New York

Investment giant Merrill Lynch is morphing its global trading network to an all-IP environment that will let the company offer new Web services, consolidate equipment and reduce maintenance costs.

The financial services firm is merging separate SNA, IPX, Banyan VINES and other networks into a single IP infrastructure with common directory services, naming conventions, security policies and remote access routines.

By doing this, Merrill Lynch hopes to reduce long-term

See **Merrill Lynch**, *page 51*

Bullish on Layer 3 switching

Find out how the New York Stock Exchange is transforming its router net with Layer 3 switches. Page 51.

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Plucky Dell plots new server foray

Vendor to roll out RAS servers, high-end clusters, NICs and more.

By Marc Songini
Round Rock, Texas

Already riding high in the server market, Dell Computer plans to increase its momentum with the rollout of new Gigabit Ethernet adapters, high-end clustering products and ISDN cards. The ISDN support will let Dell's Windows NT servers double as remote access devices.

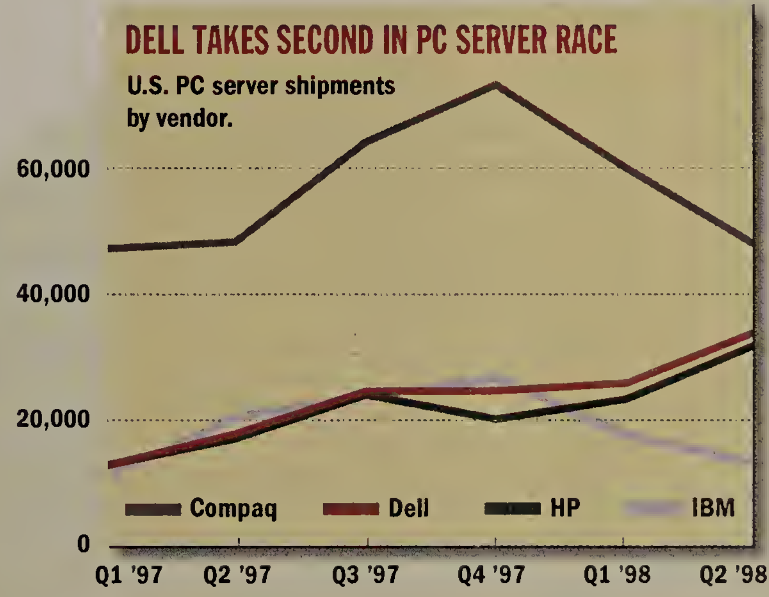
The new remote access gear, which Dell is developing with an unnamed partner, will take advantage of the routing and remote access capabilities built into NT to support intranets and virtual private network (VPN) applications.

Although a latecomer to the server game, Dell is shaking up the established players. It recently surpassed IBM to take over the No. 2 slot — behind Compaq — in the PC server market. That rapid increase in server share has helped the maverick Dell attain 60% overall growth over the past year.

Dell executives and others attribute the company's success to its direct sales model and its build-to-order manufacturing system, which Dell brought to the server market two years ago. By selling direct and handling

See **Dell**, *page 52*

Dell's PowerEdge servers are looming large.



SOURCE: IOC, FRAMINGHAM, MA

BUYER'S GUIDE

DESKTOP MANAGEMENT SUITES

JOEL NAKAMURA

Too many desktops, too little time. What you need is a comprehensive desktop management package. This week's Buyer's Guide looks at four desktop management suites shipping today and two on the horizon. Check out the test results inside, and pick up on the most important features in our trend story. Take a look at our online Buyer's Guide chart, which showcases nearly a dozen desktop management suites designed to make your life a little easier.

Coverage begins on page 33.

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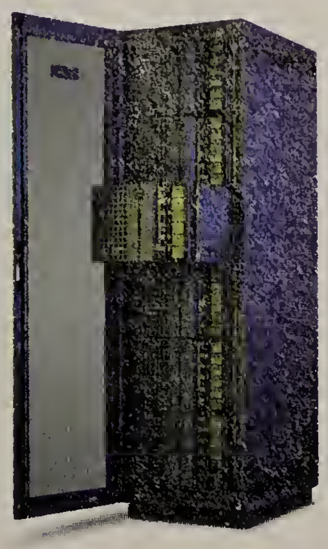

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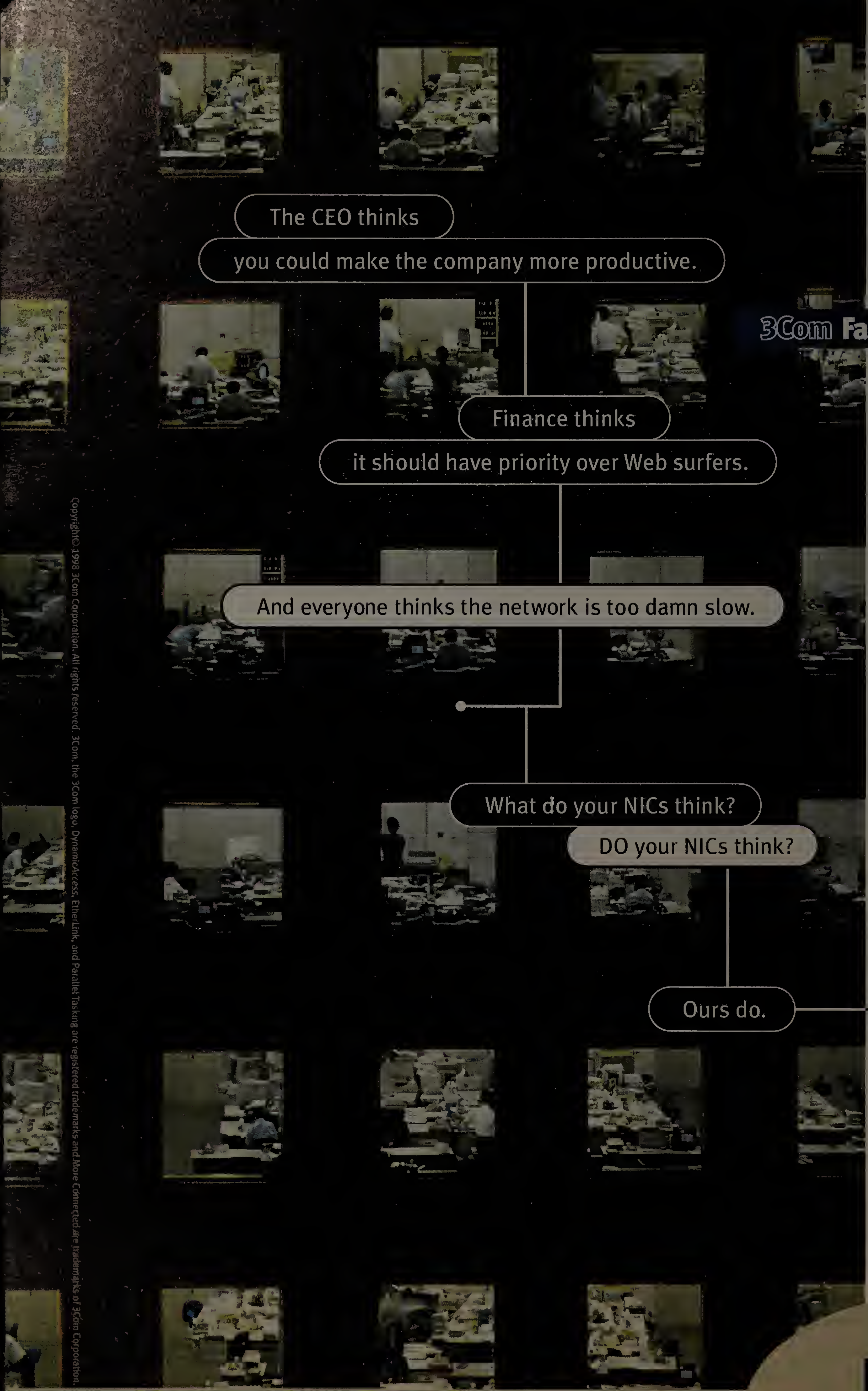
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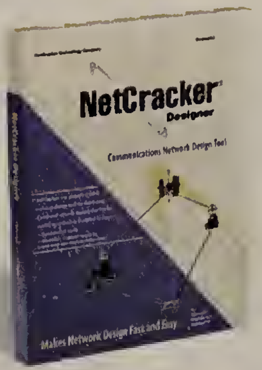
CUSTOMER CONNECTION

According to Big Blue's Linda Sanford, IBM's new software company will boost customer support. Page 20.

IS THE NETCRACKER SWEET?

NetCracker software can design complete networks and prompt you when you do something stupid, such as forget that a PC needs a NIC. Page 15.


NetCracker
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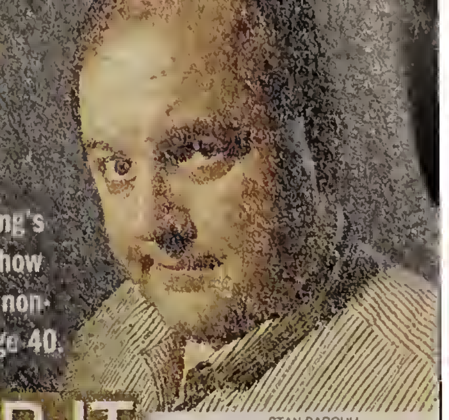
BRIDGING THE GAP

First Annapolis Consulting's John Appel has learned how to work effectively with non-technical managers. Page 40.



STAN BAROUH

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DESKTOP MANAGEMENT SUITES

JOEL NAKAMURA

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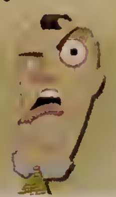
ISSUES AND TRENDS: *Desktop management suites can save you a lot of time on your feet, as soon as you get past their complexity.* Page 36.

INTERACTIVE BUYER'S GUIDE: *Go to www.nwfusion.com for details on 10 products.*

CLARIFYING QoS: *Our primer on quality-of-service capabilities translates technical gobbledygook into plain English.* Page 37.



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This Week

Only on Fusion

Water cooler. Storage-area networks are a good idea. But with Fibre Channel? Nah, just use Gigabit Ethernet, Features Editor Paul Desmond says. **DocFinder: 8432**

Keeping current. OK, so they haven't yet built unbreakable encryption. That's still no reason to throw your hands up, Fred McClimans says. **DocFinder: 8433**

IP convergence. What are your plans for merging voice and data onto IP? Let us know, and see what other Fusion readers have to say, in our convergence forum. **DocFinder: 8434**

Help desk. A reader wants to use PPTP to connect customers to his servers. But he wants to ensure one customer can't get onto the others' machines. How? **DocFinder: 8435**

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News briefs, August 17, 1998

Bay to issue network-policy products

■ Administrators looking to get a better handle on how their network bandwidth is used or how users can gain faster access to network resources may be happy to know that Bay this week will unwrap its plan for policy-based networks. Don't expect help soon though: The policy products won't be available until the second quarter of 1999. Some of the components of Bay's Optivity Policy Services will be:

- Optivity Policy User Interface, which extends Bay's NetID address management software to let administrators configure application/user policies. The component has a Web-based interface.
- Optivity Configuration, which configures intelligent devices with rules for access, security and service in multivendor networks.
- Optivity Policy Server, which validates requests for access or service levels against policy information stored in a directory. It also pulls policy information from the directory and dynamically configures quality-of-service levels and security on network devices.

Costly surfing

■ By eliminating recreational Web surfing, a company paying $500,000 per year for T-1 access could save $125,000, according to research compiled by SurfWatch Software. In the understatement of the week, SurfWatch says employees spend some part of their workdays surfing the World Wide Web for nonwork-related information. More to the point, however, is that according to SurfWatch research, recreational activity has increased in the past three months. SurfWatch says almost 25% of employees' online time is used for surfing the Internet for recreational purposes.

Sprint to trial IP telephony

■ Sprint this week will begin a service trial that lets customers make telephone calls over the company's IP backbone at a lower cost than traditional calls. The service, Sprint Callternatives, will be offered to customers in Atlanta, Dallas, Los Angeles, San Francisco and Seattle.

Trial customers will be able to make calls throughout the U.S., including Puerto Rico and the U.S. Virgin Islands. Trial customers can also make calls to India, Japan, South Korea, Taiwan and Mexico City. Sprint didn't say how much cheaper Sprint Callternatives calls would be. However, the company did say how users would be charged: Sprint will prebill the credit cards of trial service customers in $10 and $25 increments.

✆ Sprint: (816) 624-6000

MCI Concert sold out

■ British Telecommunications will pay $1 billion for MCI's 24.9% equity stake in Concert Communications Services. MCI says the deal will be finalized after MCI merges with WorldCom within the next few months. MCI will offer nonexclusive Concert services in the U.S. for up to five years after the merger. Contracts signed for Concert services with MCI before the end of a two-year period will be supported by MCI and Concert for three additional years.

Lycos buys portal pop

■ Lycos, of Waltham, Mass., last week added some pop to its Web portal by snapping up WhoWhere, Inc. for $133 million in stock. In addition to its well-known directory service, WhoWhere also includes an e-mail service, MailCity, and angelfire.com, a Web community site. The Lycos network also features the tripod.com Web site hosting service. Based in Mountain View, Calif., WhoWhere will remain a business unit of Lycos.

Java boosts enterprise messaging

By Chris Nerney

It is the unsung hero of distributed computing.

But if Sun Microsystems and a group of 14 other vendors have their way, enterprise messaging will become a critical, widely used way to help network applications on different platforms communicate with each other.

And Sun officials are counting on a newly released specification — Java Message Service (JMS) 1.0 — to lead the way.

Enterprise messaging is a method for transmitting data from one enterprise application to another (see graphic). Its main advantage is that enterprise messaging eliminates the need to synchronize applications from multiple vendors running on different platforms, a difficult task even for experienced developers.

There are a number of enterprise messaging middleware products available, such as IBM's market-leading MQ Series software, Tibco's Rendezvous and Modulus Technologies' InterAgent Java.

Proprietary APIs

However, according to Sun Senior Staff Engineer Mark Hapner, these and other enterprise messaging products "all have their own proprietary APIs," forcing developers to write custom interfaces for each.

JMS is designed to provide a common API. The specification is the work of engineers from a number of vendors with messaging middleware products, including BEA Systems, IBM, Novell, Oracle, Sybase and Tibco.

Hapner says JMS will improve programmer productivity by defining a set of messaging concepts and programming strategies that will be supported by all JMS-compliant messaging systems.

"JMS gives you this common face that all of these different vendors support," Hapner says.

Enterprise messaging is not as well-known as other distributed computing technologies such as Common Object Request Broker Architecture and Component Object Model, which are based on the Remote Procedure Call (RPC), Hapner says.

RPC allows one application to request a service from another application running on another platform. It is a "synchronous" operation, which means the requesting application must cease running until the data from the other application is received.

Defining the message

Enterprise messaging, on the other hand, is "asynchronous," according to Ian Brackenbury, an IBM engineer and chief scientist in the company's Hursley Laboratory in Hursley, England.

"A messaging infrastructure puts up a queue between an application on Machine One and an application on Machine Two," he says. "It provides the buffer between the different protocols and architectures on either side."

A messaging product developer for a network company said that "anything that helps open up more applications has to be beneficial."

The JNS 1.0 source code can be downloaded from Sun's Web site at java.sun.com/products/jms/docs.html. ■

Just the facts

Enterprise messaging middleware allows the exchange of information between applications. There are two basic types of middleware:

Point-to-point systems, such as IBM's MQ Series software, use queues from which clients extract messages.

Publish/subscribe systems, such as Tibco's Rendezvous, send data directly to subscribing applications without prompting.

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WINDOWS CD-ROM

Despite the hype about people soon being able to watch movies streamed over the Internet to their PC monitors, the video experience today is frustrating for both end users and Web site developers alike.

On the user side, video quality suffers from postage stamp-sized playbacks and low bandwidth. That's if the user even sees the video; many require plug-ins that need to be downloaded and installed. For many people, it's just not worth the trouble.

And Web sites that want to offer video have to buy expensive servers just to run their multimedia files out to users.

Now an Israeli company has released a product designed to eliminate the plug-in hassles for viewers and the high cost of video servers for Web site owners.

GEO Interactive, Inc.'s new Emblaze VideoPro is a tool for developers to convert any AVI file into streaming video with synchronized audio for their Web sites.

The software uses compression and audio synchronization technology that ensures quality playback even at 28.8K bit/sec, according to GEO Marketing Vice President Brad Grob.

Features available to developers include a scalable architecture that optimizes video for specific bandwidths, batch processing for compressing multiple files without manually configuring each program and movie buffering to compensate for fluctuations in bandwidth connection.

Emblaze VideoPro costs $295 and runs on Windows 95 and NT.

GEO Interactive: (800) 576-7751 or www.emblaze.com.

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Single Point Installation Of Client Agents And Options Across The Enterprise	✓	
Centralized Backup Database	✓	
Grandfather-Father-Son Media Rotation	✓	✓
High Performance Software Tape RAID Backup/Recovery	✓	
"Snapshot" On-Line Image Backup	✓	
On-Line Backup Agents For Lotus Notes In Addition To Microsoft Exchange	✓	
Leverages Microsoft's Common Object Model (COM) Architecture	✓	✓
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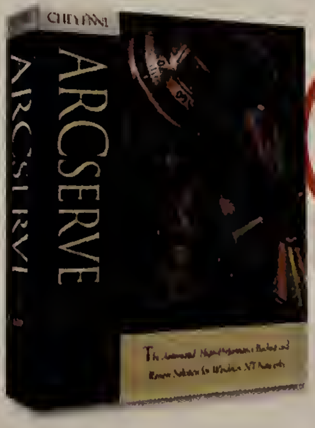

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EDI tech is toast. Not!

Despite claims to the contrary, this venerable EC technology just gets bigger.

By Ellen Messmer

Is traditional Electronic Data Interchange — an aging technology used for creating electronic commerce documents such as purchase orders and shipping notices — headed for the dustbin of history? Some say it is. But try telling that to EDI users and a bevy of research houses predicting strong growth for the venerable commerce system.

That doesn't mean that all is rosy in EDI land. Even its biggest supporters admit that EDI software is hard to use and expensive, as are accompanying value-added network (VAN) services. As a result, EDI never caught on as much as expected in the 25 years since it was developed by the transportation industry.

Now, after all this time, there is a serious threat. The World Wide Web is pushing into every corner of the electronic commerce world. Advocates of a new Web technology called Extensible Markup Language (XML), which creates format-neutral business documents, say XML may kill off EDI formats. To top it off, the Internet offers an alternative to the specialized VANs carrying EDI traffic.

Some believe EDI's worst enemy is, well, EDI. There's the perception that the whole EDI approach — which locks business data into a machine-readable flat file sent by one trading partner to another — is doomed by its rigid format, lengthy EDI standards development and its pre-Internet brittleness.

"EDI is a dead man walking," declared Commerce One President and CEO Mark Hoffmann in his keynote at the Internet Commerce Expo earlier this year. Even Judy Kilpatrick, president of the Data Interchange Standards Association, which shepherds the ANSI X12 EDI standards, succumbs to hand-wringing over EDI's fate. "Traditional EDI has been complex and expensive to implement," says Kilpatrick. "Is EDI dead? Some people will never use it, so for them it might as well be dead."

However, any talk of the death of EDI applications or the proprietary VANs that carry EDI traffic may be a bit premature. First, independent studies by two research firms, Dataquest and International Data Corp. (IDC), show EDI growth moving respectably up, not down. Market analysis from Framingham, Mass.-based IDC shows the EDI user community spends about $822 million to send EDI documents over the EDI VANs, and that figure is expected to grow to $2.4 billion by 2002.

In the long run, the Web may extend, rather than shorten, EDI's useful existence. Web sites increasingly act as a front end to capture commerce data in HTML and convert it into EDI format, and then send it over either the Internet or a VAN. Almost all the traditional EDI service providers (see graphic) offer some form of Internet-based EDI software or service.

However, despite some high-profile EDI users such as Mobil Corp. jumping into 'Net-based EDI, there's no sign yet that the traditional EDI community has raced en masse to put EDI traffic on the Internet. And this is in spite of the fact the EDI VANs, unlike ISPs, typically charge by the byte for messages sent and received by the user.

Experienced EDI users say worries about the 'Net's lack of security and reliability preclude any abrupt change. "There will be some Web-based EDI in the insurance industry, but almost all the property and casualty business goes through the Insurance Value-Added Network Service based on the IBM Global Network," says Chip Lawson, senior product manager at IVANS, an industry-owned network-service organization in Greenwich, Conn.

The VANs also endure as important middlemen, monitoring critical EDI traffic to ensure it's delivered, performing a huge amount of document conversion within their networks when asked, and helping trading partners coordinate use of so-called EDI transaction sets such as purchase orders and shipment notices.

XML: A kinder, gentler EDI?

Though the first XML standard was finalized by the World Wide Web Consortium just last winter, XML is being put into products fairly quickly. In fact, XML enthusiasts claim XML will eventually usurp EDI software, and consequently, EDI services. "Our view is EDI — taken as a concept — will persist," says Jonathon Weinstein, Microsoft's lead project manager for commerce marketing. "However, I would tend to agree that traditional EDI, with proprietary networks and flat files, will go away over time."

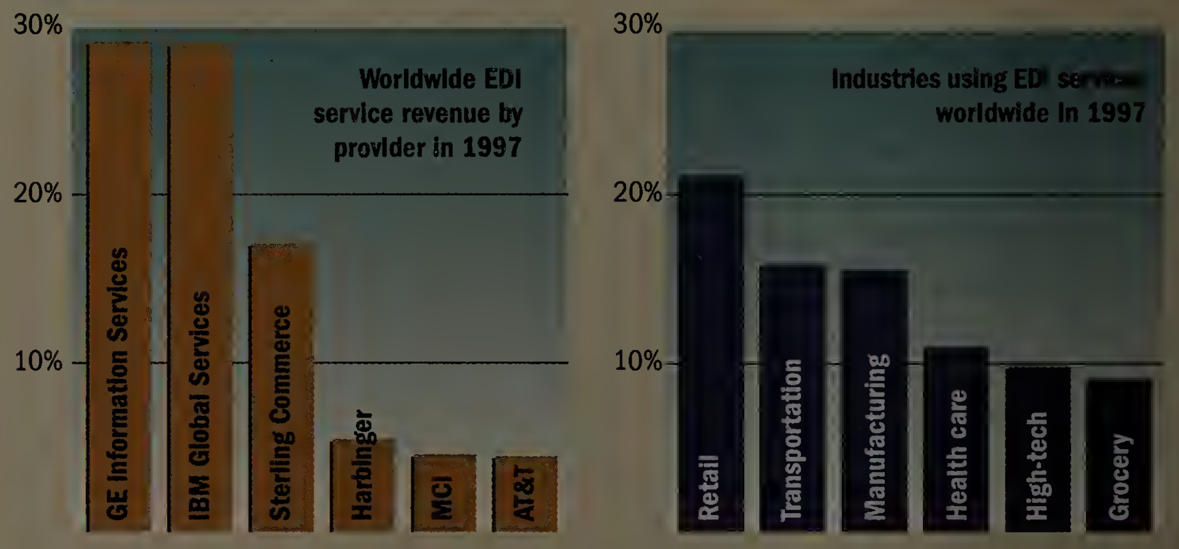
But even some XML pioneers admit the talk about EDI goes too far. Saying the whole EDI construct is dead "is like saying the mainframe is dead," comments Frank Moss, chairman of Portsmouth, N.H.-based start-up Bow Street, Inc., which designs applications in XML. "But XML is standardizing EDI so people can use it better."

So far, EDI users don't seem to be impressed by the XML crowd, though they're trying to keep an open mind about it.

"XML is being touted to replace EDI by people who don't understand what EDI is," says Ed Hubbard, corporate director for electronic commerce at Cummins Engine Co. ■

EDI LEADERS

Total worldwide EDI revenue is $822.5 million. Here are how the market leaders break down by percentage, along with a look at the top user categories:



SOURCE: IOC RESEARCH, FRAMINGHAM, MASS.

E-spire aspires to be a top ISP

CLEC bases strategy on new switches and private interconnections.

By David Rohde

Annapolis Junction, Md.

A rising competitive local exchange carrier (CLEC) is hoping to join the top rank of ISPs with a series of new switch installations and private interconnection agreements.

E-spire Communications, an up and coming national CLEC emphasizing bundled voice and data services, last week announced it has signed private network interconnection agreements with UUNET and Sprint as well as specialized Internet provider Exodus Communications. E-spire is also bulking up with eight new points of presence (POP), bringing its total to 48, and by obtaining leased T-3 links among the POPs.

E-spire officials claim the moves bring them closer to the top rank of ISPs because the company will no longer handle the bulk of its traffic at congested, public hand-offs sites known as network access points (NAP).

Most of E-spire's POPs are located in the southern half of the country, though its new POP locations include New York and Chicago. Most of the POPs include collocated circuit- and packet-switching gear such as Newbridge 36170 multiservice ATM switches and Lucent 5ESS telephony central office switches. ■

Choosing your grade of service

E-spire's prices for T-1 Internet access services:

Type of service	Description of service	One-time set-up charge	Monthly recurring charge
Basic	T-1 access only	$1,000	$1,350
Select	Includes remote monitoring of access line	$1,250	$1,450
Premier	Includes remote monitoring, Web reports, DNS service and CPE management	$1,500	$1,700

Discounts of 5% to 15% available for term contracts. 56K to 10M bit/sec options also available.

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Signature (required) Date

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Company

Division/Mail Stop/Military Branch or Base

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City State Zip

If there is a parent company, please provide name: ____________________

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1. What is the principal business activity at your location?

(check ONE only)

01. ☐ Manufacturing (other)
02. ☐ Finance/Banking
03. ☐ Insurance/Real Estate/Legal
04. ☐ Health Care Services
05. ☐ Hospitality/Entertainment/Recreation
06. ☐ Media/TV/Cable /Radio/Print
07. ☐ Retail/Wholesale Trade/Business Services
08. ☐ Transportation
09. ☐ Utilities
10. ☐ Education
11. ☐ Process Industries (Mining/Construction/Petroleum Refining/ Agriculture/Forestry)
12. ☐ Government (Federal/State/Local)
13. ☐ Military
14. ☐ Aerospace
15. ☐ Consulting (Independent)*
16. ☐ Carriers/Interconnects
17. ☐ Internet Service Provider (ISP)
18. ☐ Manufacturing (Computer/Communications/OEM)
19. ☐ Resellers of Computer/Network Products (VARs, VADs)
20. ☐ Systems/Network Integrators*
21. ☐ Distributors (Computer/Communications)*
22. ☐ Other *(please specify)* ____________________

** Please complete form based on largest client.*

2. What is your job function?

(check ONE only)

NETWORK IS MANAGEMENT:

1. ☐ Network Management
2. ☐ LAN Management
3. ☐ Datacom/Telecom Management
4. ☐ IS/IT/MIS/CIO/Systems Management
5. ☐ Internet/Intranet/Electronic Commerce Mgmt., Webmaster
6. ☐ Engineering Management
7. ☐ Corporate Management (CEO, Pres., VP, Dir., Mgr., Financial Management)
8. ☐ Consultant (Independent)
9. ☐ Other ____________________

3. What is the estimated value of Network equipment and services that you specify, recommend or approve the purchase of?

(Please print the appropriate number code on the line next to each product category. Please complete ALL categories A–N.)

1. $100 Million or more
2. $50 Million to $99.9 Million
3. $25 Million to $49.9 Million
4. $10 to $24.9 Million
5. $1 to $9.9 Million
6. $100,000 to $999,999
7. $50,000 to $99,999
8. Under $50,000
9. None of the above

A ______ Large Systems *(Mainframes/Minis)*
B ______ Desktops *(Micros/Laptops/Workstations)*
C ______ Servers
D ______ LANs
E ______ WAN Equipment
F ______ Carrier Services
G ______ Internetworking
H ______ Internet
I ______ Intranet
J ______ Extranet
K ______ Remote Access
L ______ Peripherals
M ______ Software
N ______ Service/Support

4. What is the total number of sites for which you have purchase influence?

(check ONE only)

1. ☐ 100+ 2. ☐ 50 – 99 3. ☐ 20 – 49 4. ☐ 10 – 19 5. ☐ 2 – 9 6. ☐ 1 7. ☐ None

5. What is the total number of Servers/Clients/LANs installed/planned at your location/in your entire organization?

(check ONE box in each column)

SERVERS At Location A		SERVERS Entire Org. B	CLIENTS At Location C		CLIENTS Entire Org. D	LANS At Location E		LANS Entire Org. F
☐	1. 50,000+	☐	☐	1. 50,000+	☐	☐	1. 50,000+	☐
☐	2. 10,000 to 49,999	☐	☐	2. 10,000 to 49,999	☐	☐	2. 10,000 to 49,999	☐
☐	3. 1,000 to 9,999	☐	☐	3. 1,000 to 9,999	☐	☐	3. 1,000 to 9,999	☐
☐	4. 100 to 999	☐	☐	4. 100 to 999	☐	☐	4. 100 to 999	☐
☐	5. 50 to 99	☐	☐	5. 50 to 99	☐	☐	5. 50 to 99	☐
☐	6. 10 to 49	☐	☐	6. 10 to 49	☐	☐	6. 10 to 49	☐
☐	7. 1 to 9	☐	☐	7. 1 to 9	☐	☐	7. 1 to 9	☐
☐	8. none	☐	☐	8. none	☐	☐	8. none	☐

6. What is your scope and involvement in purchasing decisions for network products and services for your enterprise?

A. Scope (check one only)

1. ☐ Corporate/Enterprise
2. ☐ Department
3. ☐ None

B. Involvement (check ALL that apply)

1. ☐ Create Network Strategy
2. ☐ Recommend/Specify
3. ☐ Approve
4. ☐ Evaluate
5. ☐ Determine the Need
6. ☐ None

7. What is the estimated number of employees at your location/in entire organization?

(check ONE in each section)

A. At your location:

1. ☐ Over 20,000
2. ☐ 10,000 – 19,999
3. ☐ 5,000 – 9,999
4. ☐ 2,500 – 4,999
5. ☐ 1,000 – 2,499
6. ☐ 500 – 999
7. ☐ 250 – 499
8. ☐ 249 or less

B. Entire organization:

1. ☐ Over 20,000
2. ☐ 10,000 – 19,999
3. ☐ 5,000 – 9,999
4. ☐ 2,500 – 4,999
5. ☐ 1,000 – 2,499
6. ☐ 500 – 999
7. ☐ 499 or less

8. Please indicate the products/services that you are currently involved in purchasing or plan to purchase:

(check ALL that apply)

A. Currently involved in purchasing B. Plan to purchase

INTERNET/INTRANET

A B
☐ 01. ☐ Internet Services/Web Hosting
☐ 02. ☐ Firewalls/Security/Encryption
☐ 03. ☐ Web Servers/Software
☐ 04. ☐ Web Servers/Hardware
☐ 05. ☐ TCP/IP Software
☐ 06. ☐ Management/Monitoring Software
☐ 07. ☐ Voice/Video Over IP
☐ 08. ☐ VPN Equipment/Services
☐ 09. ☐ Legacy Integration Tools (Web to Host)
☐ 10. ☐ Web Development Tools (JAVA, ActiveX, etc.)
☐ 11. ☐ Push Technology
☐ 12. ☐ Web Browsers
☐ 13. ☐ Intranet Applications/Groupware
☐ 14. ☐ Search/Retrieval Products (web crawler)
☐ 15. ☐ Electronic Commerce Tools
☐ 16. ☐ Web Authoring Tools
☐ 17. ☐ Other ____________

LOCAL-AREA NETWORKS/ INTERNETWORKING

A B
☐ 18. ☐ Local-Area Networks
☐ 19. ☐ Network Operating System Software
☐ 20. ☐ Servers
☐ 21. ☐ Print Servers
☐ 22. ☐ Routers
☐ 23. ☐ ATM Switches
☐ 24. ☐ Token-Ring Switches
☐ 25. ☐ Ethernet Switches
☐ 26. ☐ Fast Ethernet
☐ 27. ☐ Gigabit Ethernet
☐ 28. ☐ Layer 3 Switches
☐ 29. ☐ Network Storage Devices (NASs, SANs)
☐ 30. ☐ LAN Storage/Backup
☐ 31. ☐ Optical Storage/Backup/Jukeboxes
☐ 32. ☐ Disk Storage/Backup
☐ 33. ☐ Tape Storage/Backup
☐ 34. ☐ RAID Storage/Backup
☐ 35. ☐ Network Test/Diagnostic Tools
☐ 36. ☐ Cables, Connectors, Baluns
☐ 37. ☐ UPS
☐ 38. ☐ Network Interface Cards (NICs)
☐ 39. ☐ Hubs
☐ 40. ☐ Intelligent Hubs
☐ 41. ☐ Stackable Hubs
☐ 42. ☐ Bridge/Router
☐ 43. ☐ SNMP Network Management
☐ 44. ☐ Gateways
☐ 45. ☐ Concentrators/Repeaters
☐ 46. ☐ Other *(please specify)* ____________

COMPUTERS/PERIPHERALS

A B
☐ 47. ☐ Thin Clients/Network Computers (NCs)
☐ 48. ☐ Laptops/Notebooks/Sub-Notebooks
☐ 49. ☐ Micros/PCs
☐ 50. ☐ Minis
☐ 51. ☐ Mainframes
☐ 52. ☐ Workstations
☐ 53. ☐ Printers/Network Printers
☐ 54. ☐ CD-ROM/DVD
☐ 55. ☐ Fax/Modem Boards
☐ 56. ☐ Memory/Chips/Boards/Cards
☐ 57. ☐ Other ____________

REMOTE/WIRELESS COMPUTING

A B
☐ 58. ☐ Remote Access Products
☐ 59. ☐ Remote Access Services
☐ 60. ☐ PDAs
☐ 61. ☐ PCMCIA Devices
☐ 62. ☐ Wireless Data Equipment/Services
☐ 63. ☐ Cellular Equipment & Services
☐ 64. ☐ Other *(please specify)* ____________

SOFTWARE/APPLICATIONS

A B
☐ 65. ☐ Network Management
☐ 66. ☐ Systems Management
☐ 67. ☐ Security
☐ 68. ☐ Communications Software
☐ 69. ☐ Terminal Emulation
☐ 70. ☐ Operating Systems
☐ 71. ☐ Applications Development Tools
☐ 72. ☐ Database Management/ RDBMS
☐ 73. ☐ Groupware
☐ 74. ☐ Workflow
☐ 75. ☐ EDI
☐ 76. ☐ E-mail
☐ 77. ☐ Desktop Videoconferencing
☐ 78. ☐ Imaging
☐ 79. ☐ Suites/Server Suites (Back Office, etc.)
☐ 80. ☐ Middleware
☐ 81. ☐ Document Management
☐ 82. ☐ Site Metering Tools
☐ 83. ☐ Computer Telephony Integration (CTI)
☐ 84. ☐ Data Warehousing
☐ 85. ☐ Anti Virus Software
☐ 86. ☐ Multimedia
☐ 87. ☐ Yr. 2000 Conversion Software (Y2K)
☐ 88. ☐ Helpdesk
☐ 89. ☐ Web Based Management Tools
☐ 90. ☐ Directory Services
☐ 91. ☐ Other *(please specify)* ____________

WIDE-AREA NETWORK EQUIPMENT & SERVICES

A B
☐ 92. ☐ 56 Kbps Modems
☐ 93. ☐ Under 56 Kbps Modems
☐ 94. ☐ Cable Modems
☐ 95. ☐ Asynchronous Transfer Mode (ATM)
☐ 96. ☐ Frame Relay Equipment/Services
☐ 97. ☐ ISDN Equipment & Services
☐ 98. ☐ FT-1/T-1/T-3 Multiplexers/Services
☐ 99. ☐ xDSL Services/Products
☐ 100. ☐ Diagnostic/Test Equipment
☐ 101. ☐ DSU/CSU
☐ 102. ☐ PBXs
☐ 103. ☐ Videoconferencing
☐ 104. ☐ Leased Lines
☐ 105. ☐ Switched Data
☐ 106. ☐ Virtual Private Networks (VPN)
☐ 107. ☐ FRADs
☐ 108. ☐ Managed LAN/Router Services
☐ 109. ☐ Other ____________
☐ 110. ☐ Outsourcing/Systems Integration Services
☐ 111. ☐ Education/Training Services
☐ 112. ☐ None of the above (1–111)

9. Please indicate the platforms that are currently installed/planned:

(check ALL that apply)

A. Currently Installed B. Planned for purchase

NETWORK PROTOCOLS

A B
☐ 01. ☐ TCP/IP
☐ 02. ☐ IPv6
☐ 03. ☐ SNA
☐ 04. ☐ Novell IPX/SPX
☐ 05. ☐ APPC/APPN/LU 6.2
☐ 06. ☐ NETBIOS
☐ 07. ☐ NFS
☐ 08. ☐ SNMP
☐ 09. ☐ Other ____________

LAN ENVIRONMENT

A B
☐ 10. ☐ Gigabit Ethernet
☐ 11. ☐ Switched Ethernet
☐ 12. ☐ Fast Ethernet (100 Megabit Ethernet)
☐ 13. ☐ Ethernet
☐ 14. ☐ ATM
☐ 15. ☐ Token Ring/Token Ring Switching
☐ 16. ☐ IP Switching
☐ 17. ☐ Layer 3 Switching
☐ 18. ☐ FDDI
☐ 19. ☐ 100Base-T
☐ 20. ☐ 10Base-T
☐ 21. ☐ Fibre Channel
☐ 22. ☐ Other ____________

NETWORK OPERATING SYSTEM

A B
☐ 23. ☐ Windows NT
☐ 24. ☐ Windows NT/Advanced Server
☐ 25. ☐ Novell IntranetWare
☐ 26. ☐ Novell (NetWare 5.X)
☐ 27. ☐ Novell (NetWare 4.X)
☐ 28. ☐ Novell (NetWare 2.X, 3.X)
☐ 29. ☐ Microsoft (LAN Manager)
☐ 30. ☐ Banyan (VINES)
☐ 31. ☐ IBM (Server)
☐ 32. ☐ Other *(please specify)* ____________

COMPUTER OPERATING SYSTEM

A B
☐ 33. ☐ NT Server
☐ 34. ☐ NT Workstation
☐ 35. ☐ Unix/Xenix/AIX/SCO
☐ 36. ☐ Solaris
☐ 37. ☐ Windows
☐ 38. ☐ Windows 95
☐ 39. ☐ Windows 98, .9x
☐ 40. ☐ DOS
☐ 41. ☐ OS/2, OS/2 Warp
☐ 42. ☐ IBM MVS/VM/VSE
☐ 43. ☐ Digital VMS
☐ 44. ☐ Macintosh
☐ 45. ☐ Other ____________
☐ 46. ☐ None of the above (1–45)

10. Which of the following Servers/Clients do you have installed/planned at your location?

(check ALL that apply in each column)

	A. Servers		B. Clients		A. Servers		B. Clients
Power PC	☐	01.	☐	486, 386, 286	☐	07.	☐
Power Mac	☐	02.	☐	Sun Sparc	☐	08.	☐
Mac Other	☐	03.	☐	Risc	☐	09.	☐
Multiprocessor Servers	☐	04.	☐	Alpha	☐	10.	☐
Pentium II (PII)	☐	05.	☐	Other	☐	11.	☐
Pentium/Pentium Pro	☐	06.	☐				

11. Which of the following hardware platforms are installed/planned in your company?

(check ALL that apply)

A - Mainframes (Large Scale)

1. ☐ IBM
2. ☐ Amdahl
3. ☐ Cray
4. ☐ Hitachi
5. ☐ Unisys
6. ☐ Other ____________

B - Minis (Midrange)

1. ☐ IBM RS/6000
2. ☐ IBM AS/400
3. ☐ Digital
4. ☐ Tandem
5. ☐ Unisys
6. ☐ AT&T GIS
7. ☐ H-P
8. ☐ Data General
9. ☐ Other ____________

C - Workstations

1. ☐ Sun Microsystems
2. ☐ Silicon Graphics
3. ☐ Digital
4. ☐ H-P
5. ☐ IBM
6. ☐ Other ____________

12. What is the estimated gross revenue of your entire company/institution?

(check ONE only)

01. ☐ $20 billion or more
02. ☐ $10 billion to $19.9 billion
03. ☐ $1 billion to $9.9 billion
04. ☐ $500 million to $999.9 million
05. ☐ $100 million to $499.9 million
06. ☐ $50 million to $99.9 million
07. ☐ $10 million to $49.9 million
08. ☐ $5 million to $9.9 million
09. ☐ $4.9 million or less
10. ☐ None of the above

13. For which areas outside of North America do you have purchase influence?

(check ALL that apply)

1. ☐ Europe 2. ☐ Asia 3. ☐ South America 4. ☐ Australia 5. ☐ Middle East 6. ☐ None

FORM: 9801

Please indicate the names and job functions of other individuals at your location to whom you would like us to send a copy of **NetworkWorld**

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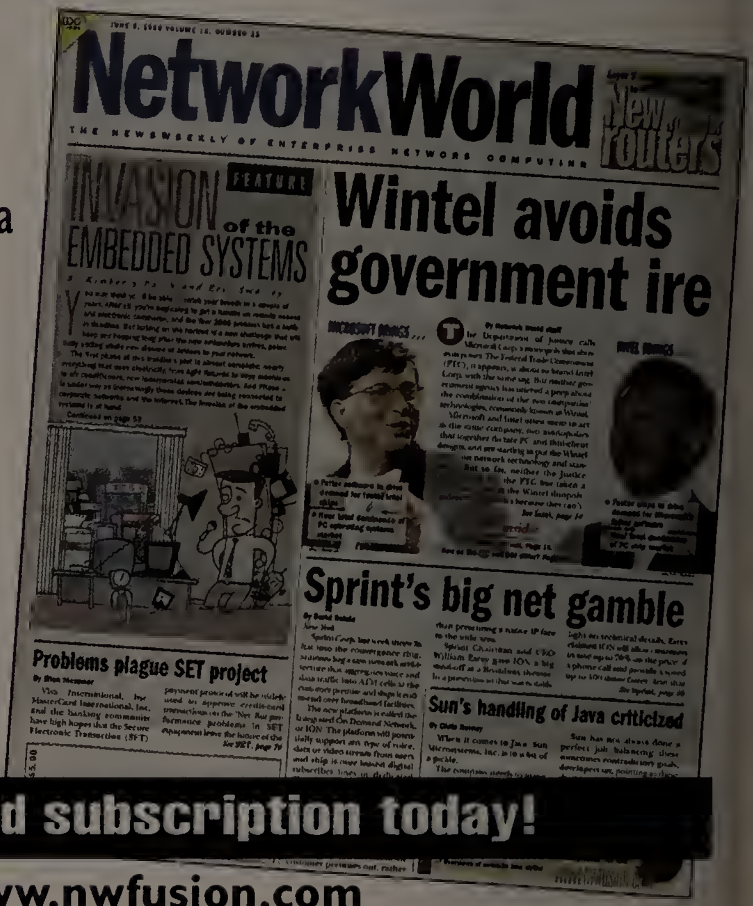
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Novell draws first in NOS showdown

New NOS has great potential, but some yearn for a better price.

By Paul McNamara
Orem, Utah

Some Novell customers and industry experts believe the company has erred on the high side in pricing its soon-to-be-released NetWare 5.0, which is more expensive than the product it will replace.

Nevertheless, Novell watchers see a tremendous opportunity for the network giant to regain momentum and market share from Microsoft with this upgrade, which beats Windows NT 5.0 out the door by a wide margin.

Novell last week staked out its most precise NetWare 5.0 delivery target to date — "by Sept. 20" — and for the first time talked pricing. NetWare 5.0 will sell for $1,195 per server with a five-user license included.

Additional client packs will be available in familiar increments of 5, 10, 25, 50, 100, 250 and 500. The base price represents a 10% increase over the current cost of NetWare 4.11.

The announcement is drawing mixed reaction.

"While I do feel they could be more aggressive, pricing is not the key to getting Novell maximum exposure" for NetWare 5.0, says Mike Scott, MIS manager at Tech Electronics in St. Louis.

The key, according to Scott and many other Novell watchers, is the company's ability to drive its message home to corporate decision makers.

"All levels of business people should be excited about NetWare 5.0 — not just the techies in the back room, but even the executives who never see the software," Scott says. "As long as they don't price themselves out of the market — which they definitely are not — Novell can continue to win customers through superior products and good evangelism."

Among the major improvements in NetWare 5.0 are native IP support, an enhanced version of Novell Directory Services that supports Lightweight Directory Access Protocol 3, new Internet security features, and what the company claims is the industry's fastest Java Virtual Machine. FastTrack Web server from Netscape and the Oracle8 database will be bundled free with the release.

NetWare 5.0 "brings down the barriers between the Internet and the corporate network," John Slitz, Novell's senior vice president of marketing, told reporters and analysts last week during a telephone conference.

More than 350,000 beta copies of NetWare 5.0 have been distributed, with a handful of companies having already incorporated the code into their production systems, Novell says.

"We are running our business on NetWare 5.0," Slitz says, noting that the company has 264 servers running the software.

One industry expert says he believes Novell may have missed an opportunity to create a bigger splash for NetWare 5.0.

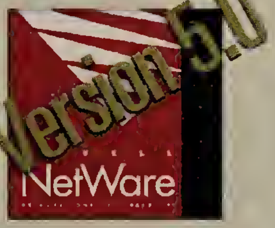
"All of the NetWare beta reports have been very solid," says Todd Chipman, a senior analyst with Giga Information Group in Santa Clara, Calif. However, "from a pricing standpoint, they still have a ways to go. I was hoping they were going to go more to a seat-based approach, where you're paying per connection."

The stakes are high for Novell, he adds.

"The problem is that if they get the pricing model wrong, they could literally leave hundreds of millions of dollars on the table," Chipman says. Nevertheless, he predicted that Novell is likely to "reevaluate their whole pricing model" within the next year, perhaps near the release of NT 5.0. ■

BEFORE NETWARE 5.0 SHIPS

Novell set more than 180 shipping criteria for NetWare 5.0. The following have already been met:



- An enrollment of 25,000 people in the company's DeveloperNet program.
- At least 250 production servers up and running at Novell.
- At least 200 certified NetWare 5.0 applications.
- The blessing of at least five corporate customers that are already running NetWare 5.0 beta code in production.

Microsoft touts Outlook 2000 client

By Paul McNamara
Redmond, Wash.

A scant five months after shipping Outlook 98, Microsoft has begun beating the drums for its next e-mail client upgrade, Outlook 2000.

Some customers, however, say it's too soon for them to even consider another migration.

Outlook 2000 is supposed to ship in early 1999 as part of Microsoft's next desktop productivity suite release, Office 2000, says Judy Lew, an Outlook product manager. But it will also be available separately, she says.

"Outlook 98 was released outside of Office only because Outlook 97 was a Version 1.0 release, and there were a lot of things we heard from our customers that we wanted to be able to get out there quickly," Lew says. "Rather than waiting for the next release of Office, we did an interim release with Outlook 98 back in March."

Future plans

Planned enhancements for Outlook 2000 include:

- A Contact Activity Tracking feature that allows a user at a glance to see the records of all interactions he has completed or has scheduled with a particular contact.
- The ability to create Outlook Bar shortcuts for frequently used Web pages. When clicked, the page is displayed in a right-hand pane within the e-mail client.
- Office E-mail, which lets a customer compose a message using any Office application, such as an Excel spreadsheet or Word document, and have it sent as HTML.

The benefit of this is that the recipient doesn't need to have the originating application in order to read the message.

- Full support for the iCalendar standard, which will allow users to send and receive meeting requests.

Outlook 2000 will also make synchronization easier for users accessing Microsoft's Exchange Server, Lew says.

"Setting up off-line folders in Outlook 97 and 98 required a manual process for every single folder," she says. "We're going to give you a single dialog box to actually check off the folders you want enabled for off-line synchronization."

Customer views

Customer reaction to the blueprint was muted at best.

"I don't see too much new here" in Outlook 2000, says David Byrkit, e-mail administrator at ITT Avionics in Clifton, N.J. "The one thing that looks interesting is the synchronization stuff, which may be a big improvement that will help our remote users."

Another customer indicated that Outlook 2000 may be ahead of its time.

"We just started rolling out Outlook 98," says Jerry Fain, manager of information technology at Winter, Wyman & Co. in Waltham, Mass. "We are never in a hurry for these products." ■

"I don't see too much new here."

David Byrkit,
e-mail administrator,
ITT Avionics

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DSL

Continued from page 1

just going point to point.

- US WEST will be able to support more customers with its Megabit service.

While business customers will have to pay far more than residential customers, the added corporate features warrant the extra cost, regional Bell operating companies claim.

Current residential DSL service for Internet access is just raw bandwidth, with no guaranteed speed across the entire network.

"It's an as-is service. If it works, it works, and if the customer is satisfied, fine," says John Cahill, executive director of BellSouth's advanced networking division.

Even as they tout new offerings, RBOCs acknowledge they cannot offer DSL everywhere. They are going to target metropolitan areas where large numbers of people telecommute and businesses need to connect remote sites.

"Our thrust is to connect as many of our customers as possible with broadband access to network services. The problem is, when you get into rural areas, the cost is prohibitive," says Matt Rotter, executive director of US WEST's Megabit DSL services.

Next year, BellSouth is looking to offer DSL services that will run over new or specially conditioned copper lines and will support higher bandwidths. "It will use ATM quality of service on part of the link at a higher price," Cahill says.

Business customers want service-level guarantees for availability, bandwidth and time to repair, he says.

Bell Atlantic also wants to offer different service-quality levels and prioritization schemes. DSL is now considered a point-to-point connection, but in the middle of 1999, Bell Atlantic will offer a service supporting multiple destinations, according to Fran Leithead, Bell Atlantic product manager for XDSL business marketing.

Multiple destination support will be accomplished using a DSL scheme whipped up by industry heavyweights, including Microsoft, Cisco and FORE, to run PPP sessions over ATM over a DSL link.

This way, one customer could connect with an ISP in one PPP session, for example, and start a new session connecting to the corporate network using PPP over ATM.

The scheme requires outfitting the customer site with an ATM interface to the DSL line.

Bell Atlantic is also shooting for symmetric DSLs to fill the void between 56K bit/sec dedicated lines and T-1 lines.

Most current DSL services are asymmetric, with download speeds more than double the upload speeds. "Our plans are to get [DSL-based] fractional T-1 services out to the business market that would be competitively priced," says Liethead.

He says the company is weighing how high to set prices for its business-class DSL by looking at what it already charges for similar-speed frame relay and ATM services.

Down at BellSouth

BellSouth's Cahill says his company is looking at symmetric DSL at speeds faster than T-1 but slower than T-3.

The symmetric DSL implementations are nothing more than fractional T-1 and T-3 under a different name, according to Frank Dzubeck, president of Communications Network Architects in Washington, D.C.

In fact, RBOCs already use high-bit-rate DSL to provision T-1 lines.

Meanwhile, competitive local exchange carriers (CLEC) push symmetric DSL, Dzubeck says. "But really what they're implementing is fractional T-1. They can't call it that because if they do, they'll get into the bind of RBOC comparisons," he says. "DSL is used as a digital local loop equivalent of T-1 services, and that's where it should be at this moment, trying to knock down those T-1 prices."

Problems solved

While they are bristling now with bright ideas about DSL, RBOCs have been far slower to deploy the technology than CLECs. In part, DSLs say, that is because they face a raft of technical and regulatory problems and market pressures CLECs don't.

Some potential customers are skeptical. "Maybe they are letting some of the leaders go out there and establish a market presence for DSL. It makes you wonder if it is going to be one of those things where there will be a lot of hoopla, then nothing happens," says Rick Curry, a store technical operations team leader for J.C. Penney.

WHAT'S TAKING SO LONG?

Regional Bell operating companies are slow to roll out digital subscriber line services because:

Federal regulations discourage RBOCs from deploying DSL.

They are waiting for a standard on consumer DSL gear that will boost demand.

It costs a lot to build a network that can handle DSL.

They fear cannibalizing some of their existing services, such as T-1.

But the RBOCs can and do rattle off a long list of impediments. The RBOCs are prevented by the Federal Communications Commission from offering long-distance service, which means they cannot directly link sites that span local calling areas without calling in a long-distance carrier. This limitation hobbles RBOCs when they try to offer end-to-end services to customers, the RBOCs say.

Waiting for standards

RBOCs also evaluate gear by stringent routines so they only put case-hardened equipment in their networks. That testing takes longer than the tests CLECs might use.

And RBOCs, more so than the competitive carriers, have waited for standards to settle down. With their greater reach, the RBOCs say they need to install gear that can be installed and maintained across their service areas.

That is not so much a problem for CLECs, according to Eric Geis, general manager for the western region for Rhythms, a Colorado-based CLEC. If Rhythms has pockets of unique gear, that's OK to a limited degree, Geis says.

Despite standards problems, US WEST dove into DSL early with its Megabit service, and had to decide whether DSL sales would hurt other services.

"Some customers who are probably buying Megabit would have bought ISDN. [With Megabit] they clearly get more bandwidth for less money," US WEST's Rotter says.

Some critics say RBOCs also fear cannibalizing their T-1 services, which are close in bandwidth to some DSL offerings. DSL prices are typically a fifth or less than T-1 prices.

But even competitors see DSL as supplemental to T-1 services, not as a replacement. "For many of our industrial customers, that is exactly their network design. A fraction of their links are T-1 lines, another proportion are DSL. DSL is an addition instead of a replacement," says Gloria Farler, vice president of marketing for Rhythms.

That may change, she adds, as pragmatic network managers become more confident in the reliability of DSL. ■

New Compaq NIC connects Fast Ethernet channels

Dual-port card conserves server slots, offers 400M bit/sec duplex connection.

By Tim Greene
Houston, Texas

With a new network interface card (NIC) from Compaq, users can pool Fast Ethernet connections into high-speed links between servers and other network devices, while conserving slots in their server chassis.

Compaq's 10/100M Ethernet NC3122 card can bond four physical Fast Ethernet connections into a single logical link between the server and a switch or router, creating a 400M bit/sec duplex connection.

The inverse muxing technology, called Fast Etherchannel, was developed by Cisco and is supported by Cisco Catalyst 5000 switches and 7500 series routers.

The card also supports an alternative method for combining channels, known as adaptive load balancing. With adaptive load balancing, up to four Fast Ethernet connections can be blended in one direction to carry traffic away from a server to a switch. The connections are not bonded for incoming traffic, so all incoming traffic must use one 100M bit/sec port.

Adaptive load balancing can increase server uptime by enabling traffic from a failed port to be automatically switched to other ports on the server.

Announcement of the card last week fulfilled Compaq's promise earlier this year to support Fast Etherchannel, which provides customers with a way to move beyond Fast Ethernet links without investing in Gigabit Ethernet gear.

"If you had just one server under extremely large load conditions, you would use adaptive load balancing or Fast Etherchannel," says Andrew Gilchrist, vice president of IS for Investment Counselors of Maryland.

Because each card has two rather than one 10/100M Ethernet port, network managers can get more ports per server or conserve slots in their servers for other types of cards.

The cards also support PCI Hot Plug, technology developed by Compaq and Intel, which enables customers to swap out a failed card without shutting down the server. PCI Hot Plug is supported by Compaq's ProLiant 6500 and 7000 Pentium Pro high-end servers.

The new cards represent a way to increase the speed of connections to lower end servers, according to Justin Smith, an analyst with International Data Corp. in Framingham, Mass.

Many low-end servers lack the slot capacity to handle the multiple NICs needed for faster server connections, Smith says.

© Compaq: (281) 370-0670

W3C boosts XML with namespace spec

By Andy Eddy

The World Wide Web Consortium (W3C) recently revised its draft specification for defining a namespace under Extensible Markup Language (XML). The combination of namespaces and XML promises to improve data handling and foster the creation of versatile Web pages.

While HTML enables the simple publishing of content, XML offers the manipulation and display of data via Web-based applications. Site developers gain flexibility and strength from XML, which enables them to describe their data through the creation of custom tags that are interpreted by an application processing the XML code, much like the fields of a database.

However, this versatility also brings with it the possibility of confusion in the event that multiple data sources use the same tag name. Say, for instance, *Network World* displays a chart of recommended books, which are compiled from the database of a bookseller such as Amazon.com. Under that scenario, a problem arises if *Network World* designated the article's byline with a tag <author> (to aid in the archiving and search processes) and Amazon.com similarly designated the book authors in its database with the tag <author>.

The namespace concept provides for the use of unique prefixes in a Web page's code that combine with tags from each particular source. In the previous example, the identical <author> tags could be made unique with namespaces along the lines of <nw:author> and <amaz:author>. Each prefix alerts an application to descriptive metadata, located elsewhere in the page code, which provides a location for referencing each source's respective tag set.

At the least, namespaces provide for the creation of elaborate Web pages. But they also improve a user's ability to filter specific, critical data out of the Internet's extensive clutter. As the 'Net grows, the likelihood of a search engine providing mis-hits increases. Lauren Wood, technical product manager at SoftQuad, a software company in Vancouver, British Columbia, says tagging content allows a search engine to make sense of what it finds, thereby giving more qualified responses to a query. Namespaces further clarify data that comes from multiple sources.

More importantly, namespaces serve to prevent collisions that would choke an application. According to Tim Bray, co-editor of the Namespaces in XML specification and principal of Vancouver-based consultancy Textuality, labeling data with custom tags isn't enough to prevent such conflicts.

"If I have a compound document with tags from four different places, I'm not going to have a piece of software that knows what to do with those sources," Bray notes. "[A namespace] gives the tags and attributes universal names that are guaranteed to be unique."

The full-scale adoption of XML is still a ways off as all the related specifications and standards come together, and as vendors work them into their products. Though he's in the early stages of using XML tags in his company's content, Ron Lee, Webmaster for the *Dallas Morning News*, understands how namespaces will enrich the process of content delivery.

"Everybody is worried about a standard," Lee says. "With [namespaces], everyone would have their own set of tags and a key so they can understand those tags. It opens up all kinds of possibilities." ■

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for your business
to access
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ISP

Continued from page 1

features that give customers faster, more secure VPNs.

But the big boys aren't lying down just yet. Three of the top ISPs — AT&T WorldNet, WorldCom Advanced Networks and GTE Internetworking — are testing some of the latest VPN tunneling and security protocols that will be deployed in next-generation VPN services.

IP-based VPNs offer corporations private network capabilities, but they use carrier Internet facilities for transport. While VPNs promise cost savings and flexibility, performance and security are key issues for corporate buyers.

Glenn Botkin, intranet manager at Galaxy Scientific, an Egg Harbor Township, N.J., engineering firm, says users are waiting anxiously for ISPs to bring secure, robust VPN services out of the labs and into their product portfolios. "We want a provider to come to us with a complete VPN package, and I don't feel any ISP has that today," Botkin says.

ISPs at work

But large companies are working to address Botkin's complaint.

AT&T, for instance, is currently testing a variety of new technologies, including the Layer 2 Tunneling Protocol (L2TP), the Point-to-Point Tunneling Protocol (PPTP), Internet Security (IPSec) and digital certificates, with some of its customers, says Ed Nalbandian, a managing partner for AT&T's Managed Network Solutions division. These tests are expected to result in improved WorldNet VPN services that offer users stronger encryption and better network performance.

AT&T WorldNet's VPN service, introduced late last year, supports TCP tunneling, which is not the most efficient means for shuttling private corporate data over the Internet. TCP tunneling adds more overhead to IP packets than other tunneling protocols, including PPTP, which is more popular today than TCP tunneling.

MARK ESCHER

Galaxy's Botkin *is waiting for ISPs to take VPN action.*

As a first step toward improving its VPNs, Nalbandian says AT&T will deploy L2TP tunneling support next. L2TP is a pending IETF specification that combines technology from PPTP and Cisco Systems' Layer 2 Forwarding (L2F) protocol. One of the benefits of L2TP is that it can support multiprotocol traffic.

While AT&T is also testing IPSec, Bob Schroder, product manager for IP services at AT&T WorldNet, says more work still needs to be done to ensure the protocol doesn't bog down networks.

IPSec, also a pending IETF specification, defines how to encrypt IP packets carried over a secure tunnel through a public or private IP network. IPSec uses a powerful 164-bit key encryption algorithm based on the Digital Encryption Standard (DES).

The specification supports the use of digital certificates based on the X.509 Version 3 standard. Digital certificates are based on public and private keys, and are typically issued by certificate authorities such as banks or other trusted institutions. These certificates authenticate users trying to access information across the VPN.

WorldCom's plans

WorldCom Advanced Networks expects to support digital certificates next year, but is waiting for Cisco Systems' and Microsoft's Active Directory platforms to become available, says Skip Taylor, group manager for remote access services at WorldCom Advanced Networks.

Cisco Networking Services for Active Directory (CNS/AD) is expected to store information about applications, users, routers and switches (*NW,* May 11, page 8). Taylor believes the best way to manage digital certificates for thousands of users will be to house that information in a directory that's more flexible than the typical directories based on the Lightweight Directory Access Protocol (LDAP).

WorldCom is also vigorously pursuing L2TP, Taylor says. The ISP is expecting Cisco's first draft of L2TP tunneling software this week.

What's ahead at GTE?

AT&T WorldNet and WorldCom Advanced Networks may not today be offering VPN services as advanced as those marketed by Concentric Network, Epoch or TCG CERFnet, but the two giants at least have formal offerings. GTE Internetworking, one of the largest business ISPs, has yet to introduce a VPN service.

But expect that to change by year-end, says John Summers, senior product manager at the ISP. And for its VPN service, GTE Internetworking is currently testing hardware encryption devices that are believed to offer users the highest level of security and performance, says Greg Howard, senior analyst at Infonetics, a San Jose, Calif.-based consulting firm.

Compared to software-based encryption, such as the type that GTE Internetworking is using with its SitePatrol managed firewall services, hardware can encrypt and decrypt data faster, Summers says.

GTE Internetworking will also have an edge in the digital certificate arena. Sister company GTE CyberTrust is a digital certificate authority, and GTE Internetworking plans to tie its upcoming VPN service into GTE CyberTrust's operations. That could make it easier for VPN customers to manage thousands of digital certificates.

But users should keep in mind they don't need to wait for any of these ISPs to finish up their testing. Epoch Internet and TCG CERFnet's are already using hardware encryption devices from Red Creek, and both support IPSec and digital certificates. Concentric Network also has a VPN service based on VPNet's IPSec hardware encryption devices. ■

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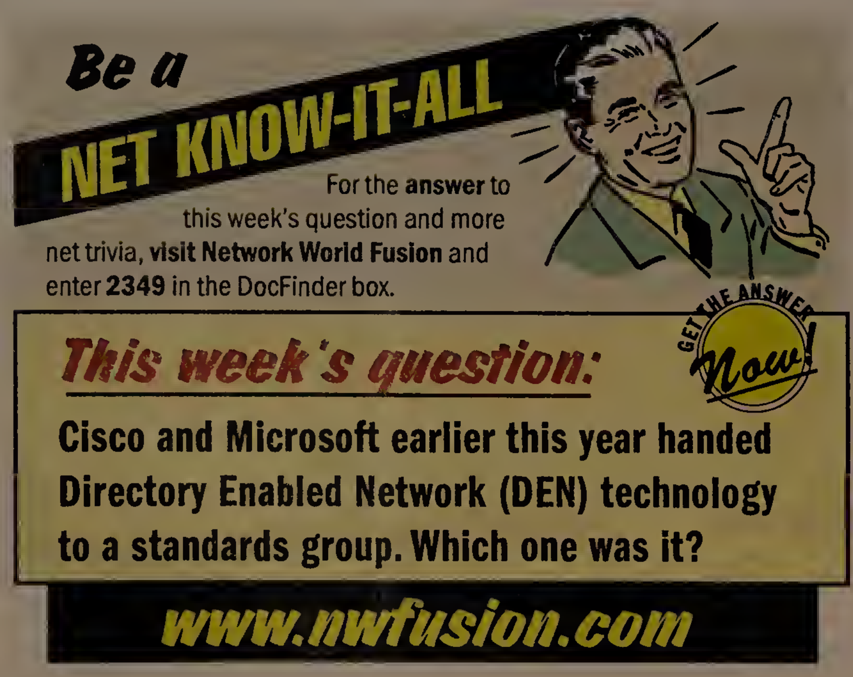


For the answer to this week's question and more net trivia, **visit Network World Fusion** and enter **2349** in the DocFinder box.

This week's question:

Cisco and Microsoft earlier this year handed Directory Enabled Network (DEN) technology to a standards group. Which one was it?

www.nwfusion.com

AT&T beefs up service management software

By Denise Pappalardo
Durham, N.C.

AT&T Solutions is making it easier for its customers to keep an eye on their networks with the company's latest release of management software.

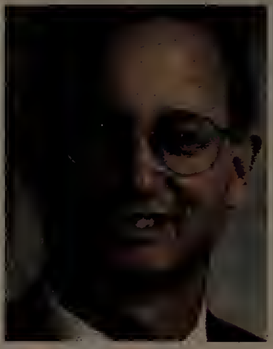
The company this week will announce it has upgraded the Global Client Support Center with Global Enterprise Management System (GEMS) Release 7.1.

The upgraded network management system will offer users reports on everything from network usage, network availability and even trouble tickets — all accessible via the World Wide Web.

GEMS is a proprietary software system AT&T uses to manage and monitor its Managed Network Services and outsourcing customers.

Web-based access to reports and network statistics was a key feature Quantum was looking for when it signed up AT&T to manage Quantum's frame relay, ATM and private line nets earlier this year, says Mark Scalzo, Quantum's director of network and desktop development.

Quantum, located in Milpitas, Calif., designs and manufactures storage products such as hard disks and tape drives.



AT&T's Kohan *says the new system manages multivendor CPE.*

"We are moving much of our communications to the Web, and we want our partners to also be moving in that direction," Scalzo says.

Having access to all of your business clients and partners through a single interface is easier for network administrators to support, he says.

In addition to migrating its reports to a Web-based platform, AT&T has also added support for multivendor element management systems (EMS), says Jeff Kohan, head of client partners at AT&T Solutions.

For example, with GEMS 7.1 AT&T now supports Newbridge Network's Mux and Motorola's FRAD management systems, in addition to the latest version of CiscoWorks network management software, Kohan says.

Multivendor EMS support means that users can outsource all of their CPE management chores to AT&T.

In related news, AT&T WorldNet Managed Firewall service, one of AT&T's many services that is managed using the GEMS platform, is now offering intrusion detection monitoring.

The service will gather possible and actual firewall break-in information for its Managed Firewall users.

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Briefs

■ *Despite all the talk about Gigabit Ethernet and all-switched networks, plenty of people still rely on the good old hub for network connectivity.* **D-Link Systems** *is making it even harder to go to switches with its* **new 16-port 10/100 auto-sensing hub,** *which lists for a cool $399, or less than $25 per port. Targeted for workgroups and the small office/home office crowd, the D-Link DSH-16 has a built-in segment switch, which functionally connects the two segments and handles translation and traffic flow. The hub, available now, is desktop size and has plug-and-play connections and a MDI-II uplink port for easy expansion.*

© D-Link: (800) 326-1688

D-Link's *D-Link DSH-16*

■ *When EMC bought storage management concern* **Conley Corp.** *last week, it didn't snap up the whole thing. A group of Conley managers bought out Conley's end-user business and spun it off. The new company,* **Lexias, Inc., will service end users' storage management needs.** *Lexias also plans to direct its focus more toward data protection, data retrieval and security.*

■ **Solectek Corp.** *has announced a line of wireless bridges that provide Ethernet connectivity of up to 25 miles. The line includes the MP1100-E, which supports speeds of 11M bit/sec; the MP500-E, which operates at 5.5M bit/sec; and the MP200-E, which runs at 2M bit/sec. The MP line incorporates Harris Semiconductor's HFA3860 baseband processor and PRISM radio chipset.*

The MP series costs between $3,495 and $8,895 and is available now.

© Solectek: (619) 450-1220

Taking a Windows NT 5.0 reality check

Microsoft architect discusses NT 5.0 as it relates to Exchange, DEN and more.

Q&A

Plenty has already been written and said about Microsoft's Windows NT 5.0, and the product hasn't even entered Beta 2 testing yet. *Network World* News Director Bob Brown and Senior Editor Paul McNamara recently caught up with Mark Brown, a Microsoft architect in charge of Windows NT distributed services, to find out where this key technology stands.

One of the key components of NT 5.0 is Active Directory, Microsoft's answer to Novell Directory Services. Can customers get their hands on Active Directory yet?

There is Active Directory in Beta 1, although it lacks some of the more advanced features. For example, in Beta 1 Active Directory's global catalog [GC] feature did not implement subsetting, so when you specified that a domain controller [DC] should be a GC server, that DC would hold a full copy of every domain in the directory. In Beta 2, the DC will hold only a selected subset of the attributes of objects in other domains.

When exactly will Beta 2 be released?

Sometime this summer.

Will there be a third beta release?

The original plan was that between Beta 2 and the final release there would be an intermediate build that was going to be fairly widely distributed. [Microsoft executive] Jim Allchin decided he wanted to get broader coverage than that, so he promoted that to be called Beta 3. It's going to be a public beta available on the Web.

When will Beta 3 ship?

Beta 3 is going to be based on feedback from Beta 2 and on additional test cycles we're doing ourselves. There are some features that are actually in the Beta 2 code base, but are disabled because we haven't done enough testing on them. We're going to test those, which could take some more time. If we were to announce a date at this point, that would show we aren't serious about quality.

"If we were to announce a date at this point, that would show we aren't serious about quality."

Mark Brown,
Microsoft architect,
Windows NT
distributed services

TOM KIMMELL

Microsoft has stated that companies wishing to move to Exchange 5.5 will need to implement NT 5.0, given that Microsoft will be doing away with Exchange's directory and replacing it with NT's Active Directory. How big a deal will this be for Exchange users?

Exchange Platinum servers will interoperate with Exchange 5.5 servers, much as NT 5.0 domain controllers interoperate with older NT domain controllers. So you can do the upgrade one server at a time. You arrange Active Directory objects into a tree structure to make it easy to do things like delegate administration and apply policy.

So your Active Directory tree won't be exactly the same as your Exchange Directory Server (DS) tree.

When running Exchange 5.5 and NT 5.0, you set up associations between objects in Active Directory and objects in the Exchange DS, allowing the Active Directory Connector to synchronize changes between the two directories. The goal here is simplified administration of information that's stored in Active Directory and Exchange DS.

With Exchange Platinum, you decommission the Exchange DS, and Exchange accesses Active Directory directly. You set up "views" in Active Directory to mimic the address book hierarchy that existed in Exchange DS. The net effect is an upgrade that's transparent to end users — for instance, they see the same address book before and after the upgrade. ■

Get more online:

- An expanded version of this interview.
- A look at why some shops have a go-slow approach to NT 5.0.

8422

www.nwfusion.com

NetCracker upgrade eases network planning

By Robin Schreier Hohman
Waltham, Mass.

Want to design your network and have a good time while doing it?

Then give NetCracker Technology's NetCracker Designer a crack. The new version, 2.0, includes a snazzy, color-coded animation feature that lets you create "what-if" scenarios to see how a change in a device will play out on your network, as well as a beefed-up database and a friendlier user interface.

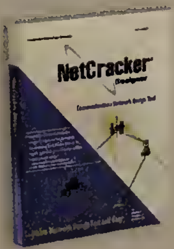
NetCracker Designer 2.0 also incorporates models of many of the latest network devices, from cable modems to circuit switches to supercomputers.

A new supercharged search engine lets you search for a device by vendor, description, port density, catalog number, bandwidth or series number. The new version will run on Windows 95, 98 and NT.

Using a drag-and-drop interface, NetCracker Designer lets you model your network onscreen device by device. If you try to do the impossible, such as connecting an ATM switch to a Fast Ethernet port or hooking up a switch directly to a workstation, the software will generate error messages alerting you to the problem.

NETCRACKER DESIGNER 2.0

- Models more than 10,000 network devices.
- Runs on Windows 95, 98 and NT.
- Offers error messages if the network is missing something, such as a network interface card.



NetCracker Designer is often used as a presentation tool as well as a network planning tool, says Jim Hurley, president of Hurley Communications (HCI), a systems integrator in Norwood, Mass.

HCI sells The Message Pro 3000, a hospital messaging system that integrates voice, digital and alphanumeric paging for hospitals. When Hurley goes to sell The Message Pro 3000 to his customers, which include UCLA Medical Center and Children's Hospital in Boston, he takes NetCracker Designer with him.

"We use it to give people a visual to show them how a network is working," Hurley says.

NetCracker Designer 2.0 will ship in October. A single license will retail for $1,995.

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WIRED WINDOWS

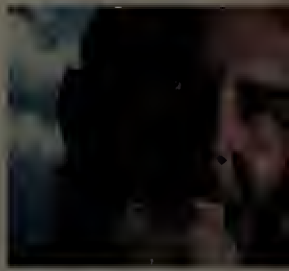
Arcnet alive and kicking

WARNING: This week's column is chock-full of nostalgia. Anyone not interested in the "good old days" is hereby warned, and advised to skip ahead to Scott Bradner's column.

I just passed another milestone, the 13th anniversary of the year I discovered LANs. The event was brought to mind by a press release I just received from the Arcnet Trade Association announcing a new free CD called "Arcnet — The First 20 Years Platinum Anthology." Sounds like something you'd see advertised at about 3 a.m. during the late, late, late movie. With, maybe, a song by KC and the Sunshine Band.

Included on the CD are such all-time favorites as "The inside story on the creation of Arcnet," "Compelling reasons to choose Arcnet today" and "Who's using Arcnet."

You see, I'd thought Arcnet was gone (except among the ranks of those still clinging to their NetWare 2.X LANs). Most, if not all, of the big-name Arcnet vendors have disappeared entirely (Thomas-Conrad) or no longer make Arcnet network cards (SMC, PureData). On the other hand, DataPoint — the company that invented Arcnet — is still selling cards (though mostly in Europe). And two other companies, Contemporary Control Systems and Toyo Electric, are still manufacturing cards as well as the hubs needed to set up a LAN.


Dave Kearns

Surprisingly, Arcnet is still going strong, just not on your LAN. It appears to be the preferred system for automobiles, factory control systems, casino games and HVAC systems, and has more than five million installed nodes.

This isn't surprising when you think about it. Arcnet is quite inexpensive, with predictable deterministic performance (as a token-passing topology) and very good distance capabilities compared with other options.

Arcnet was also the basis for the best-selling 100M bit/sec solution just a few years ago, Thomas-Conrad's TCNS (which I still use on my home network). I fondly remember the long hours I spent arguing the merits of Ethernet vs. Arcnet with Thomas-Conrad's Walt Thirion before and after I went to work for him. Just in case he's reading this — I was right, Walt!

Now if you'll excuse me, I'll go back to my Arcnet's greatest hits CD.

If you want to know more, visit (where else?) www.arcnet.com.

Kearns, a former network administrator, is a freelance writer and consultant in Austin, Texas. He can be reached at wired@vquill.com.

Tip of the week

Microsoft has released the Business Readiness Kit for Windows NT Workstation 4. It's a CD package that includes a 120-day trial version of Windows NT Workstation 4, third-party software discounts and extensive documentation about using NT Workstation. It also includes Internet Explorer 4.01 and more than 1,000 new and updated device drivers. The kit is only $19.95, and is available from www.microsoft.com/ntworkstation/ready or by calling Microsoft at (888) 296-6569.

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Briefs

Digital Equipment, *a Compaq Computer company,* **will distribute Simpact's Freeway** *programmable communications server. Freeway allows LAN-based devices, such as Digital AlphaServers, to connect to legacy WANs. Freeway will replace Digital's Commserver 100 and 150 network access servers, which are being retired.*

The first Freeway model to be offered by Digital is the Freeway 1100, which supports up to 16 serial ports for WAN access.

© Digital: (800) 344-4825; Simpact: (619) 565-1865

Racal Electronics *last week said it* **is selling its data communications business,** *including Racal Data Group and Racal-Datacom, to Platinum Communications for $47.5 million.*

The data communications business sells analog modems, DSUs/CSUs, routers and multiplexers, and lost $89 million last year.

Platinum, which buys troubled companies and tries to turn them around, did not detail what it would do with Racal's data communications business. Racal executives said they plan to make the company's telecom division independent in about a year.

Published reports say **Cisco Systems** *last week* **bought 70.5 acres of land in the Research Triangle Park, N.C., area,** *continuing the companies' phenomenal growth there. Cisco's InterWorks Business Unit, which is based in RTP, now has more than 170 acres of land. Cisco said the new site could house 2,000 employees in three buildings, but denied it had any immediate plans to develop it. Cisco already employs 820 employees in four buildings at its RTP site.*

Cisco high-end routers get connectivity boost

By Jim Duffy
San Jose, Calif.

Cisco Systems' new port adapter for its high-end routers is intended to allow users to transmit IP traffic at ATM speeds without implementing ATM.

Cisco recently announced the Packet-over-SONET (POS) port adapter for its Cisco 7500 and 7200 series routers. Designed for large enterprises and service providers, the POS port adapter gives users more flexible connectivity options than previous-generation POS modules, Cisco says.

It also brings POS connectivity to the 7200 series routers for the first time, the company says.

POS is a high-speed packet network technology that provides speeds comparable to ATM without the packet-to-cell segmentation and reassembly, and concurrent cost and potential performance overhead. POS is widely regarded as Cisco's best defense in maintaining router viability in applications in which ATM switches could replace routers.

Cisco currently offers a POS interface processor for its 7500 router that sports a single, channelized 155M bit/sec OC-3 port and uses a single slot.

The new port adapter features a concatenated — or clear channel — OC-3 and fits into one of multiple sleeves on a Cisco Versatile Interface Processor (VIP) 2-50 module.

The VIP is so named because while it uses a single slot in a router, it can house a variety of two-port adapters, such as POS, Fast Ethernet, ATM, DS-3, Ethernet and token ring. So one slot on a 7500 with a VIP can house twice as many ports per slot, as well as a mixture of different media, than non-VIP interface processors.

"It is definitely a very efficient way of transmitting IP traffic with minimal overhead. However, it consumes the entire fiber pair," says Brad Rhoades, principal engineer of US WEST's Interprise Networking Services. "We will also be looking at ATM interfaces as a preferred means of sharing backbone bandwidth and ensuring true quality of service and class of service."

Cisco claims its POS port adapter supports the company's IP class-of-service capabilities, such as Committed Access Rate, Random Early Detection and Weighted Random Early Detection, so users can offer differentiated services.

The POS port adapter is a single-port 155M bit/sec OC-3c card for the 7500 VIP2-50 or the 7200 router with the NPE-150 and NPE-200 processors. It is available in three interface types: multimode, single-mode intermediate-reach and single-mode long-reach fiber.

The multimode version costs $6,000, the single-mode intermediate-reach costs $8,000 and the single-mode long-reach costs $10,000. All versions are available now.

© Cisco: (408) 526-4000

Extending the POS-sibilities

Features of Cisco's new Packet-over-SONET port adapter:

- A single-port OC-3c for the Cisco 7500; two adapters per Versatile Interface Processor 2-50 module.
- Works with the Cisco 7200 router with the NPE-150 and NPE-200 processors.
- Supports multimode, single-mode intermediate-reach or single-mode long-reach fiber interfaces.
- Priced from $6,000 to $10,000 and available now.

Copper Mountain gear tuned for IDSL

CopperRocket device delivers high-speed net access to remote sites.

By Tim Greene
Palo Alto, Calif.

Copper Mountain's new network box squeezes every last bit of bandwidth out of high-speed ISDN digital subscriber lines (IDSL) for use as dedicated remote access links to corporate networks.

COPPERROCKET 201

- **Supports 144K bit/sec IDSL service.**
- **Can be configured remotely to offer 64K bit/sec or 128K bit/sec.**
- **Needs no configuration by user.**

The company last week rolled out the CopperRocket 201 Multi-Speed IDSL access device. CopperRocket can carry data at 144K bit/sec over regular phone lines, boosting the speed of the connection by 12.5% over conventional ISDN hardware.

Traditional ISDN terminal adapters at customer sites can support either a 64K bit/sec or 128K bit/sec data stream using one or two 64K bit/sec ISDN B channels. Copper Rocket 201 adds an extra 16K bit/sec to the line by mixing in D channel capacity, which is reserved for signaling in regular ISDN service.

The device represents a trade-off between price and performance, according to Raymond Keneipp, an analyst with Current Analysis in Sterling, Va. Many conventional ISDN routers cost about $200 less than the $595 Copper Mountain is charging for CopperRocket 201, but they cannot support 144K bit/sec speeds.

For customers switching from ISDN to IDSL, it makes sense to use the existing ISDN terminal adapter to support IDSL, says Bill Yundt, vice president of network operations for WebTV in San Francisco, which uses IDSL for remote access. In that case, the cost of the customer equipment is zero, he says.

But for customers that do not already own an ISDN terminal adapter, buying one that supports a full 144K bit/sec might make sense, Keneipp says.

CopperRocket 201 also supports a variety of speeds that can be adjusted remotely by service providers. An IDSL service provider could sell a customer a 64K bit/sec IDSL service initially, for example, and then boost the bandwidth to 128K bit/sec or 144K bit/sec if the customer wanted more speed. That increase could be accomplished by downloading software to the customer's CopperRocket 201 from the service provider's switching office, Copper Mountain says.

Changing the speed remotely requires the service provider to have Copper Mountain IDSL modems in its switching office fitted with new 24-port IDSL line cards. Copper Mountain announced last week that those line cards are also available at a suggested retail price of $7,995.

Yundt said IDSL was a good answer for WebTV for two reasons. IDSL from Covad costs

See **Copper**, *page 20*

Copper

Continued from page 19

less than ISDN from Pacific Bell if the remote user is logged on for more than 10 hours per week. ISDN is billed based on use and IDSL is billed on a flat fee. And second, the end users liked it better.

Because WebTV's IDSL service is a dedicated connection, end users do not have to dial in, pass through security and wait for a connection each time they want to tap corporate resources. That gives them the perception that IDSL is faster than ISDN, according to a survey of WebTV's IDSL users.

IDSL is deployable as far as 36,000 feet from a service provider switching office, triple the distance of some other DSL variants. That raises the probability of reaching more remote users with IDSL than other, faster DSLs.

Pure DSL technologies require high-quality phone lines that have been conditioned by removing devices that would interfere with DSL transmissions. They are also limited by distance. The longer the line, the slower the speed of the DSL connection.

IDSL, with its roots in ISDN, can be delivered at top speed over an 18,000-foot phone line, and that distance can be doubled with a repeater.

IDSL can also be supported over carrier equipment known as digital loop carriers (DLC). Other forms of DSL require a special line card in the DLC, but IDSL can pass through standard DLC gear to the carrier switching office. DLCs serve about 20% of phone lines in the U.S.

✆ Copper Mountain: (650) 858-8500

IBM creates new software firm

Company to focus on customer mgmt. packages.

By Nancy Weil
Boston

IBM is forming an independent software company devoted to enterprise customer relationship management (CRM).

CRM involves a company taking an overall look at its customers and the need to improve the relationship between the two. It is somewhat of a customer-service hybrid.

Businesses that deploy CRM software can use customer profiles or demographics information to better a customers' network or software requirements. The idea then is to build customized products and services.

IBM Global's *Sanford*

The new firm will be based in Indianapolis, with sales, development and support offices worldwide.

W. Scott Webber has been named CEO of the new firm. He was formerly CEO of Software Artistry, the Indianapolis-based firm acquired in January by IBM's Tivoli Systems.

Yet to be determined are the company name; which IBM business units will merge into the new venture; the number of employees; and the percentage of IBM's revenue expected to be derived from the CRM software operation, say Webber and Linda Sanford, general manager of IBM Global Industries.

Decisions about employees should be made within the next couple of weeks, Webber says.

Software products that apply to the CRM market are those that involve integrating existing legacy systems and data collected for years about customers, Sanford says. She adds that data warehousing and data mining products also are part of the CRM portfolio.

The push for CRM products has led to a "frenzied and very fast and furious competitive environment" pushed by network technology, Sanford says.

IBM CEO Louis Gerstner has identified CRM as a cornerstone of the company's electronic commerce strategy.

According to market researcher Dataquest, less than 20% of the CRM market has been tapped in the U.S., where Informix, Microsoft and Oracle are the big CRM players.

The CRM market is forecast to grow at a compounded annual rate of 44% by 2002.

IBM can be reached at (914) 765-1900.

Weil is a correspondent with IDG News Service's Boston bureau.

New software traces IP performance

By Marc Songini
Redwood City, Calif.

New management software from Applied Expert Systems (AES) is aimed at helping users track enterprisewide IP performance.

Clever eRoute, which is designed to track the performance of tn3270 and TCP/IP sessions, is the latest package in the company's mainframe-based Clever family of management software. The software can help users diagnose problems and manage the performance of devices in SNA and TCP/IP nets.

This capability is becoming increasingly important as users need to monitor the growing amounts of tn3270 traffic in their enterprises (see graphic).

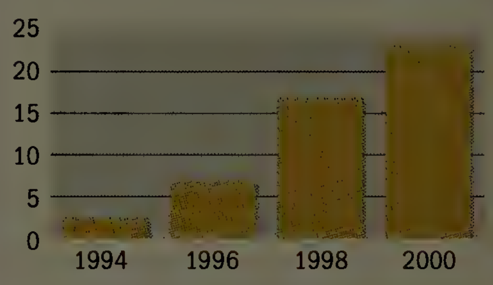
Clever eRoute, which will be announced this week, consists of an MVS server application that resides on the mainframe and tracks TCP/IP traffic coming through VTAM. A client application runs on any Windows workstation and provides a graphical view of data gathered by the mainframe application.

The product works by sending out a TraceRoute, a common IP command similar to a ping. The TraceRoute signal travels over the network and reports back a number of performance statistics, such as transmission speeds, packet loss and response times. It also discovers devices and routes in a net, and helps users develop a more accurate topology map of their enterprise. The TraceRoute signal can be directed to a group of switches or specific routes and route segments.

TraceRoute data is stored in an SQL database in a mainframe. Administrators can access this information and view it in a Windows PC. The data is presented to administrators in a customizable form, such as a geographical map of the network. Administrators will be able to collect statistics, analyze data and make projections about network performance.

Big growth

tn3270 installed base (in millions).



SOURCE: IDC, FRAMINGHAM, MASS.

From eRoute information customers can:

- Identify performance problems in remote net gear.
- Discover which routes are used most and which need to be fine-tuned for maximum performance.
- Measure average response times.
- Determine net capacity and service-level planning information.

In related news, AES will announce an upgrade to its Clever TCP/IP package. Included in Version 2.0 is the addition of Simple Network Management Protocol MIB II support, so administrators can more easily gather data on routing tables and device status.

Data collected by AES' Clever packages can be programmed to kick off and automate a response, such as restarting a failed session using the mainframe's automation routines.

Clever TCP/IP 2 is in beta and will be a free upgrade to current Clever users. New users will spend between $28,000 and $50,000, depending on configuration. Clever eRoute will be available in the fourth quarter of this year. Pricing has not been determined.

✆ AES: (650) 364-1222

Tivoli, SMARTS team on management pack

By Rebecca Sykes
Austin, Texas

New software from Tivoli Systems should help network administrators quickly get to the bottom of network problems.

Tivoli, an IBM subsidiary, last week announced that it will integrate System Management ARTS' (SMARTS) InCharge network management software into the Tivoli Management Environment (TME). InCharge event correlation software is designed to help users pinpoint and resolve network, system and applications problems.

Observers say while TME software gathers a lot of management information, it doesn't help users easily target the source of a problem. Event correlation tools, such as SMARTS' InCharge, consolidate alerts and then sift out the appropriate data for administrators.

The Tivoli Enterprise Console can do simple correlation today, but observers say TEC needs to do more. Around 80% of network downtime stems from the difficulty of diagnosing what is wrong with a network, according to Shaula Alexander Yemini, president of SMARTS.

"Any problem that occurs results in tons of symptoms, and many problems will cause almost the same set of symptoms, so it's very difficult to just look at the alarms on the screen, which could be in the hundreds, and say, 'Aha! I know what broke'," Yemini says.

InCharge's Codebook Correlation technology automatically diagnoses network problems in real time so problems can be resolved before they become unwieldy.

According to Elisabeth Rainge, analyst at International Data Corp. in Framingham, Mass., assistance with diagnosis of network problems could be especially important for TME customers, which typically have large, complex networks.

InCharge will remain a standalone product, starting at $25,000. It will be available beginning in the fourth quarter.

Tivoli can be reached at (512) 794-9070.

Sykes is a correspondent with IDG News Service's Boston bureau.

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- **An overview of SMARTS' event-management architecture.**
- **News of other Tivoli management initiatives.**

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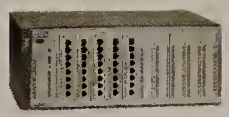

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Briefs

■ **Sage Networks,** *a Cambridge, Mass., Web hosting service company, earlier this month* **acquired Maikon Internet Services.** *Maikon, based in Richardson, Texas, offers shared Web hosting services based on Unix servers. Sage is building its business on acquiring regional Web hosting service companies. Maikon is the ninth service provider Sage has acquired this year.*

© Sage: (617) 374-4700

■ **WinStar Communications,** *a New York-based wireless service provider, announced it will* **upgrade its network** *with a Hughes Network Systems AIReach Broadband fixed wireless access system. The system supports point-to-point, circuit-switched time-division multiplexing, frame relay and ATM data networking. WinStar will be upgrading its nationwide network over the next two years.*

© WinStar: (212) 584-4000; Hughes: (301) 428-5500

■ **Global One** *last week* **expanded its Global Dial Access** *(formerly known as Global Dial IP) service to 57 countries and 820 cities. Global One is an international telecommunications joint venture among Deutsche Telekom, France Telecom and Sprint.*

The service lets business users dial in to their corporate networks while on the road or from a remote office. The service previously was only available in 25 cities.

© Global One: (703) 689-6000

■ **Covad Communications** *last week announced it will* **expand its digital subscriber line services** *from San Francisco into three new markets — Boston, New York and Los Angeles. The company says it will offer services in 16 more cities by the end of 1999.*

Wall Street unhappy with FCC proposal

By David Rohde
New York

Wall Street is turning thumbs down on a government proposal to encourage large local carriers to speed up their broadband access-line deployments.

With the entire stock market reeling, investment analysts say regional Bell operating companies are getting no help from a Federal Communications Commission proposal authorizing the creation of separate data-services subsidiaries that would escape some traditional telecom regulations.

The Aug. 6 proposal would enable RBOCs to establish partially deregulated "advanced network subsidiaries" housing high-speed equipment such as digital subscriber line access multiplexers (DSLAM). Such equipment terminates new DSL services, which support data downloads of 1M bit/sec or greater over traditional copper links.

The problem, according to securities analysts, is that the FCC proposal comes with so many strings attached that the RBOCs are unlikely to establish subsidiaries to speed up their slow DSL deployments, even if the proposal becomes law. The FCC has promised a final ruling by February 1999.

FCC's Michael Powell *favors the new proposal.*

"RBOCs did not gain any ground in the newly proposed rules," stated PaineWebber telecom analyst Eric Strumingher in a note after the proposal was issued.

"These proposed rules are one more piece of evidence that the RBOCs are getting the short end of the stick in the deregulation of the telecommunications services industry," Strumingher added. "The Bells will be unable to sustain earnings growth and return on investment at the record levels they have enjoyed over the past two years."

In its proposal, the FCC states that RBOCs could not use the advanced network subsidiaries to offer long-distance transport of data services prior to the RBOCs gaining general long-distance authority. Two and a half years after enactment of the Telecommunications Act of 1996, no RBOC has yet gained regular long-distance approval.

The RBOCs had hoped to win this right because Section 706 of the act directs the FCC to scrap regulations if they hinder national broadband network deployment.

The FCC proposal would end the requirement that RBOCs offer ports on their DSLAMs to competitors, but would still require them to offer space in their central offices to DSL-based competitors.

Wall Street's verdict on the Section 706 proposal comes at a time when investors are also combing carefully through the stock and bond prospectuses of RBOC competitors seeking to specialize in DSL and other broadband technologies.

Since last May, offerings of high-yield bonds for competitive local exchange carriers have "dried up," according to Mark Langner, telecom research associate for Hambrecht & Quist, a San Francisco investment house specializing in IT companies.

A least one of the five FCC commissioners said he was voting in favor of the proposal because he thought it would make RBOCs and other local carriers happy and eager to invest in broadband networks.

Republican Commissioner Michael Powell says there had been an "unfortunate tendency" at the FCC to pass rules that "depend upon a company or an industry acting against its self-interest." Powell says he hopes the new proposal will spur RBOCs to accelerate their broadband offerings because doing so will offer some deregulation of data services. ■

FaxSav aims to expand IP fax nets

ISP teams with NetXchange to boost services.

By Denise Pappalardo

Sending faxes over an IP network can be a low-cost option for users — especially if a large portion of fax traffic is heading overseas. But in order to keep costs down, fax transmissions should stay "on net" as long as possible.

FaxSav and NetXchange Communications have struck a deal aimed at keeping fax traffic on IP networks until it reaches the customers' sites, thereby saving users the most money.

FaxSav is teaming with NetXchange to extend the reach of FaxSav's IP fax service, says Jeremy Soref, director of marketing at NetXchange.

NetXchange has developed an API, called Internet Xchange for Fax, which makes its fax server gateway software interoperable with FaxSav's network.

How it works

ISPs that deploy NetXchange's fax gateway will be able to link directly to FaxSav's network so users can send and receive faxes almost entirely over an IP network, Soref says.

FaxSav is the only ISP that offers the NetXchange technology, for now at least.

In some cases, especially with fax-to-fax transmissions, fax data is sent as far as possible over the Internet or over an IP fax service provider's network, such as FaxSav's. Traffic is then transferred from a fax server gateway onto the public switched telephone network until it reaches its final fax machine destination.

By teaming with NetXchange, FaxSav's services will be available to more business users almost immediately, says Maury Kauffman, managing partner at the Kauffman Group, a Cherry Hill, N.J.-based consulting firm that focuses on enhanced fax technologies.

© FaxSav: (732) 906-2000; NetXchange: (408) 248-6200

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The dollars and cents of fax over IP

Customers will be able to send faxes worldwide for less money based on FaxSav's agreement with NetXChange.

Fax from U.S. to:	Per-minute average rate using traditional telecom* services	Per-minute rate using FaxSav's IP services
Australia	$.74	$.33
Germany	$.63	$.29
China	$.87	$.39
Japan	$.78	$.35
United Kingdom	$.50	$.25

* Traditional telecommunications service rates are compiled from AT&T Select Value, MCI Vision Power Rate and Sprint Real Solutions service plans, based on the carriers' standard rate periods.

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To find out how you can take advantage of SONET ring technology, visit www.uswest.com/SONET/.

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Regulatory scrutiny? What regulatory scrutiny?

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If you read the newspapers, many articles focus on the regulatory angle of these mega-deals and how government regulators will alter the proposed merger. "Oh the regulators are going to be all over this," says one expert in an article on the AT&T/British Telecom combo.

It's funny how people talk about the regulatory situation like it's black and white. A deal will either encounter resistance or it won't. But the telecommunications industry has been nothing but one big spectrum of regulation for years, and that's not about to change.

Daniel Briere
Christine Heckart

What we've seen lately is a laissez-faire attitude toward regulation, and focusing on any regulatory gains tends to miss the big picture. The biggest argument for regulation lately is that MCI was forced to divest its Internet business to help it complete the deal with WorldCom. OK, but MCI and WorldCom are still merging.

What's the bigger impact here: 1) Cable & Wireless, which heretofore has been a virtual nonplayer in the data market, getting MCI's Internet assets; or 2) MCI and WorldCom (and MFS, UUNET, etc.) combining forces to go after the world market?

Or let's look at the AT&T/BT deal. AT&T and BT are both monopolies, and their bilateral routes will surely be regulated. Anyone who thinks differently should look at Sprint's requests to be declared nondominant on its non-France Telecom and Deutsche Telekom routes. But the big picture is that AT&T and BT will eventually do the deal, and any regulatory rules are mere inconveniences to be worked around.

Let's look at the Bell Atlantic/GTE deal. We all know that some wireless assets will have to be divested. And there will be a bunch of screaming and shouting about consumer rates. There always is. But will the regulators stop this deal? Will they appreciably change the deal? No, we don't think so.

These mergers will continue, and there will be some regulatory constraints put on them, but there has not been any real demonstration from Washington, D.C. that these mergers are not going to be allowed to continue.

We expect to see more of the same, and feel that the government has lost most of its control over the regulation of these behemoth deals. At the end of the day, the stock market has more to do with undoing deals than the regulators.

Briere is president and Heckart is vice president of TeleChoice, a consultancy in Boston. They can be reached at dbriere@telechoice.com and checkart@telechoice.com.

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Briefs

▪ **Infoliant** *of Pittsburgh last week introduced* **Millennium Direct,** *an alternative version of Infoliant's* **Web-based Year 2000 Network Advisor service** *designed for large enterprises. Both services provide customers with browser- or Lotus Notes-based access to Year 2000 compliance information about desktop and network products from more than 200 vendors. Millennium Direct, a mirrored version of Network Advisor, gives companies unlimited access to the data and spares them from having to administer separate accounts and passwords with Infoliant. Price is by quotation only.*

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▪ **Netscape** *last week announced that it has* **hired Barry Ariko** *as its executive vice president and chief operating officer. Previously an executive vice president at Oracle, Ariko will drive Netscape's efforts in worldwide sales, partnerships, professional services and training organizations.*

▪ *A California start-up,* **eGain Communications Corp.,** *is the latest entrant in a growing field of vendors offering to help corporations* **manage and respond to the high volumes of e-mail** *generated by their Web sites.*

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How Linux got so dang hot

Corporate support adds to stability, low cost and collaborative improvements.

By Andy Eddy

"I think I can, I think I can." That's the sound of Linux, the open source, "freeware" operating system, making its climb to get on more computers and into more corporate networks.

There's no doubt that the Linux train is rolling full-steam ahead: Recent announcements of large software developers that are porting their products to Linux and positive discussions in such publications as *Forbes* and *The Economist* have added momentum. The impetus is giving some supporters a reason to believe Linux could overtake Windows NT as the operating system of choice in the next few years.

After all, with Apache Web Server — also free and community-supported — rated as the most used Internet server in a Netcraft survey, there's room for a freeware operating system to be a hit. And while Microsoft has a seemingly insurmountable lead in operating system deployment, that was the case with Netscape's browsers before Microsoft decided to make a war out of it.

One hurdle that Linux must clear before it breaks heavily into enterprise settings is the common belief that cheap price equals poor quality. To those who have taken a shot with Linux, cheap price translates into low project costs — and high reliability.

"I chose Linux because it is far more stable and functional than the alternatives. My system has never crashed," says Keith Dart, a test engineer at Cisco Systems in Santa Clara, Calif.

Dart employs Linux for everyday applications, such as word processing, spreadsheets and presentations, but he also uses it for special projects, such as the testing of products.

Because Linux doesn't require powerful hardware, a lot of network administrators are taking the operating system for a test drive on older — and previously shelved — computers. Jack Tackett, manager of system operations for Nortel Information Network, based in Research Triangle Park, N.C., puts Linux to work providing ISP services across North America.

"The fact you can reuse obsolete hardware and turn it into a productive system with Linux makes it a viable choice for cost-conscious businesses and organizations," Tackett says.

Controversial support

Tackett also applauds Linux's support structure, a system that has caused some to shy away from corporate use of the operating system. While it lacks support in the traditional sense, a slew of enthusiasts and professionals in the community are more than happy to lend a hand and are just a newsgroup or mailing list away. In addition, distributors such as Red Hat Software and Caldera have rolled out formal support.

Of course, Linux has been well shaken out in the seven years since Linus Torvalds created it while he was a student at the University of Helsinki. Linux is stable, but it's also in a constant state of upgrading and improvement, and those who aren't afraid to get under the hood themselves relish the fact that they can fiddle to get the results they need.

"Occasionally, I would like slightly different behavior from an application, tool or a new feature," Dart explains. "Since I have all the source code available to me, I can alter any part I desire to fit my exact needs."

It's got the spirit

With companies such as Oracle, Computer Associates, Informix, Netscape and Corel supporting Linux with ports of their products — and with others on the horizon — Linux devotees have a lot to cheer about. Even if it doesn't become the operating system of choice for the majority, its all-for-one nature parallels the spirit behind the evolution of the Internet.

"Linux . . . does not need to [replace Windows] to be successful. For many, it is their operating system of choice," says Roldan Pozo, who works in the mathematical and computational sciences division at the National Institute of Standards and Technology.

"It may not take over the world, but it will always be loved and maintained by a global community of enthusiastic supporter,." Pozo says. ■

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Linux hits the big league

Third parties put muscle behind free operating system.

- Oracle will port Oracle8 and Oracle Applications to Linux.
- Informix offers free development licenses for Informix-SE SQL-based database engine and Informix-ESQL/C tool kit, as well as a free downloadable developers' kit.
- Netscape plans to bring its server line to Linux, starting with Messaging Server and Directory Server.
- Computer Associates indicated that a port of its Ingres II relational database engine will be available this year.

An OS by any other name . . .

It's an operating system with an identity crisis, and it warrants a '90s rewrite of the classic song: "I say 'Lynn-ux,' you say 'Lie-nux.' "

Of course, pronunciation of Linux is secondary to its usage, but inquiring minds want to know. It appears that the majority of those who use it say "Lynn-ux."

Still, standard English phonetics indicate that it should be "Lie-nux." Bob Young, CEO of Red Hat Software, referenced a rule of Olde English that says a combination of "vowel, consonant, vowel" makes the first vowel a long vowel — as in "Lie-nux."

Then again, English is the language where "book" and "soon" probably should sound the same but don't.

You'd think we could get to the bottom of this dilemma by turning to the operating system's inventor, Linus Torvalds, but his Finnish accent puts yet another variation on display: more like "Lee-nux." (At www.ssc.com/lj/images/english.au you can hear a sound clip of him saying it.)

Leave it to a businessman to cut to the chase and say what all die-hard Linux users likely think when the argument comes up. "We don't care what you call it as long you use it," Young said.

Hey, let's call the whole thing off.

— *Andy Eddy*

'NET INSIDER

When is the Internet not the Internet?

According to the published schedule, the ANX is about to get real.

For the past few years, the Automotive Network Exchange (www.aiag.org/anx) has been preparing to change the way the automotive industry does business in North America. The next big step should come at any time. That step is the publication of a list of certified service providers (ANX CSP). ANX CSPs are ISPs that have demonstrated compliance with ANX-specified requirements for network service features, interoperability, performance, reliability, business continuity, disaster recovery, security, customer care and trouble handling. ANX CSPs have also connected to one or more ANX certified exchange points.

The basic idea behind ANX is to move most of the electronic interaction among the thousands of trading partners that make up the automotive business away from private networks and to the public data network infrastructure — that is, move the communications to the 'Net. Except the ANX folks take care to say the ANX system is not the Internet even though they do mention it is part of the Internet. The difference, they say, is in the guarantees provided by requiring the trading partners to use ANX CSPs rather than just any ISP.

Scott Bradner

Of the dozen or so network service features that the ANX requires an ANX CSP to offer, the most important involves security. All ANX CSPs must be part of a public-key certificate hierarchy with its top run by the ANX. This certificate hierarchy is used to enable the ANX-wide use of the IETF's IP Security set of functions to protect and authenticate transactions between trading partners.

Since each ANX CSP must have an approved public-key certificate, which is used in real time to authenticate the CSP, this hierarchy also provides a way for the ANX to decertify CSPs that fail to maintain the required level of quality. The ANX certification authority just revokes the CSP's certificate, and the trading partners that might be customers of that CSP can no longer operate. (According to the ANX documents, some warning will be given in this case.)

I expect that as soon as the list of CSPs is released it will become the approved ISP list for many organizations that have nothing to do with the automotive industry. I also think we will quickly see other industry groups adopting the same approach to trading partner interactions. But I expect that this will be a short-lived phenomenon, and that industry-specific certification will be quickly replaced by *Consumer Reports*-style ratings, once there is a better understanding of what to rate.

It should be quite amusing to watch the reactions of ISPs that fail to get certified. Resorting to bluster and threats of legal action, instead of fixing the deficiencies, will tell me all I need to know about some ISPs.

Disclaimer: We don't do bluster at Harvard, or at least we do not call it that — the above anticipatory amusement is my own.

Bradner is a consultant with Harvard University's University Information Systems. He can be reached at sob@harvard.edu.

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Connectivity software

TCP/IP stack vendors reborn

By Chris Nerney

In 1995, the Windows TCP/IP market, driven by rising demand for technology that could connect PCs to corporate intranets and the Internet, appeared ready to explode.

That demand drew established companies such as Novell, Cisco and IBM, which competed with smaller vendors and start-ups such as NetManage and FTP Software. These vendors sold TCP/IP software to enterprise customers for anywhere from $400 to connect a single PC to $13,000 or more for 100 users.

One study by International Data Corp. (IDC) in Framingham, Mass., released in 1995, forecast a booming $1.7 billion market for the connectivity software by 1999 (see graphic).

But rather than explode, the once-promising Windows TCP/IP market virtually imploded.

This was not because customers turned away from TCP/IP. Obviously, the technology today is an integral and essential part of enterprise nets. Rather, the market for Windows TCP/IP stacks was done in largely by Microsoft, which began bundling basic TCP/IP functions with its operating system software, starting with Windows for Workgroups 3.11.

"The operating system bundling just killed the market," says Cindy Borovick, an analyst at IDC. "Certainly from a deployment perspective, the numbers have held true and even skyrocketed, but from the actual business perspective, TCP/IP just got wiped out."

"There's always a danger of that happening to a market," says Ted Julian, an analyst at Forrester Research in Cambridge, Mass.

Julian says Microsoft's move introduced a familiar economic axiom into the TCP/IP space: It's hard to compete against something that's free. And, he says, the situation left many smaller vendors "pretty much in the same place — the gutter."

Not all vendors accepted defeat, however. While some companies such as NetManage and FTP Software struggled, others revised their strategies to adapt to the new marketplace reality.

"There were some vendors whose value proposition was tying all clients into existing server environments such as the IBM mainframe," Borovick says. "And those are the vendors that have survived because they have been able to offer value over and above what Microsoft is bundling."

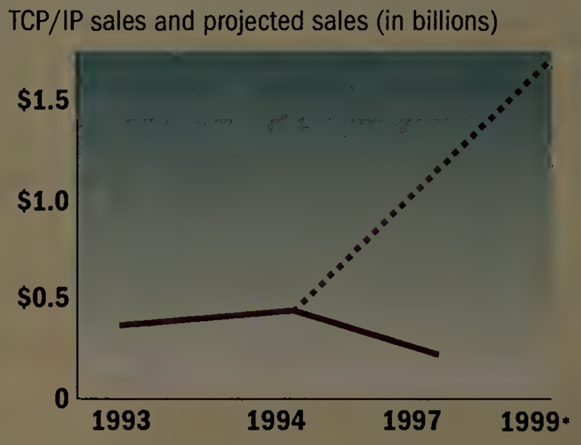
Specifically, she says, Attachmate and Hummingbird Communications are among the companies that still generate revenue from TCP/IP technology, albeit through the sale of applications that run on the stacks.

Hummingbird's HostExplorer, for example, is a terminal emulation application that links corporate data on the mainframe to desktops without requiring legacy protocols. And Attachmate's Extra HostView Server provides SNA 3270 access to browsers using Java or ActiveX controls.

Several technologies use TCP/IP to transmit over the Internet, including the World Wide Web's HTTP, File Transfer Protocol (FTP), Simple Mail Transfer Protocol and telnet, which allows users to log on to remote computers.

TCP/IP MARKET TURNS SOUTH

The revenue outlook for TCP/IP vendors was extremely promising in the mid-'90s. But Microsoft's decision to bundle the connectivity software into its operating system — while a boon for customers — essentially gutted the sales of packaged TCP/IP products.



* This was projected in 1995 IDC report.

SOURCE: INTERNATIONAL DATA CORP.

Redmond's victims

The first company to sell a TCP/IP stack was NetManage, which in 1991 released a product called Chameleon that was designed to connect Windows PCs to the Internet.

It was a big hit, and NetManage quickly emerged as a market leader, cutting an OEM deal with IBM along the way. NetManage was tabbed as a rising star in the industry, and its Chameleon connectivity software icon was a familiar fixture to thousands of PC users logging on to the Internet in the mid-'90s.

But then Microsoft dropped its bundling bomb, and NetManage was at ground zero.

"NetManage was the big [loser]," says Peter Auditore, vice president of marketing at Hummingbird. "It was like a meteorite entering the earth's atmosphere. They glow very brightly and then burn into the ocean."

The company's revenue plummeted from $33 million in the first quarter of 1996 to $19.4 million by the fourth quarter. NetManage's stock, which was trading at $22 per share as 1996 began, was down to $6 by year-end. Currently, it hovers around the $2 mark.

In an effort to survive, NetManage has broadened its software mix. The company sells a number of products in its Chameleon line, including Chameleon Unix Link for PC-to-Unix connectivity and Chameleon HostLink for PC-to-IBM mainframe and AS/400 connectivity.

Other NetManage products include Support-Now Server for services such as call centers, conferencing and back-end help desk integration, as well as OpSession, software for managing and completing internal support calls.

As part of its bid to bolster its product line and customer base, NetManage in June announced that it would purchase former rival FTP Software — the other big casualty of Microsoft's TCP/IP bundling scheme.

FTP now sells host access products such as OnWeb Host, intelligent agent software that lets users link to mainframe- or midrange-based SNA resources via any Java-enabled Web browser.

The good old days

Back in 1995, FTP was battling with NetManage and Novell for supremacy in the TCP/IP stack market.

Founded in 1986 and based in North Andover, Mass., FTP saw its fortunes fall perhaps even faster than NetManage's. Revenue fell from $106 million in 1996 to $68 million in 1997. This year the company posted an anemic $11 million in sales in the first quarter, along with nearly $4 million in losses.

FTP's stock price, trading at more than $30 at the close of 1995, now struggles to stay above $1 per share, giving NetManage an ultimately less expensive price.

Any money to be made in TCP/IP today comes from the sale of applications that run on top of TCP/IP. These include Network File System, a client/server application that lets a PC user view, store and update files on a remote computer, and tn3270, a version of telnet that lets your computer log on to an IBM mainframe.

Though Microsoft bundles basic applications with its free stack, some network professionals are dissatisfied with the company's performance and the lack of technical support.

This has led to a market for network application suites that Borovick says is growing fast. Worldwide sales for these applications have reached $607 million and could reach $867 million by 2001, according to an IDC report.

But you know how those forecasts can go. ■

Technology Update

Covering: Evolving Technologies and Standards

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A customer has a NetWare 3.1X server, and some clients were recently upgraded to Windows 95. The clients appear to work correctly, but if they log on to the NetWare LAN using Microsoft's NetWare Client and execute the standard logon script (which executes a local capture) they cannot print locally after executing an immediate end capture.

This failure happens 50% of the time. However, the clients can print to any of the redirected printers, and if the Windows 95 client does not log on to the NetWare network, local printing goes without a problem.

In addition, when the clients cannot print, they sometimes receive a "Drive A: not ready" error. This condition exists on the upgraded Windows 95 machines as well as a new machine with the OEM OSR2 version of Windows 95.

Via the Internet

I found a Microsoft TechNet article, No. Q177222, which seems to describe the problem. A file called nwredir.vxd is at fault, and you need to get an update. Contact Microsoft's technical support staff and talk to someone in the hotfix group to get the appropriate file. You probably won't be charged for the support call because this appears to address the problem.

I also suggest running the registry cleaning utility that Microsoft technical support offers in case your problem relates to the registry. The utility is in the Windows 95 download area on Microsoft's support site on the World Wide Web.

You also should check the other files in this download area to see if Microsoft has any fixes for the non-OSR2 machines experiencing the problem.

Public-key certificates protect corporate jewels

By William Stallings

Some of the most versatile network security tools are public-key cryptography and the use of certificate authorities (CA) to ensure the secure transmission of data across an intranet or the Internet. One scheme has become universally accepted for formatting public-key certificates: the X.509 standard. X.509 certificates are used in most network security applications, including IP Security (IPSec), Secure Sockets Layer (SSL), Secure Electronic Transaction (SET) and Secure Multi-purpose Internet Mail Extensions (S/MIME).

In the X.509 scheme, a user has two keys: a private key known only to the user, and a public key, which is publicly available to other users. Public-key cryptography has two main uses: key distribution and authentication. A user can encrypt a message with a conventional key, such as a Data Encryption Standard key, and then encrypt the DES key with the public key of the recipient and attach that to the message. The recipient can use the matching private key to recover the DES key, and then decrypt the message.

For authentication, X.509 and public-key cryptography provide for a device called the digital signature. A user can create a message and generate a digest, or fingerprint, of the message. The user encrypts the digest with his private key to form the signature. The recipient can use the sender's public key to decrypt the signature and match it against the fingerprint of the incoming message to assure authenticity.

Although public-key cryptography is virtually unbreakable with the proper algorithm and sufficient key length, there is one vulnerability: How does a recipient know that someone else's public key is valid?

Solving the problem

The solution to this problem is X.509 and the public-key certificate. In essence, a certificate consists of a public key plus a user identification of the key owner, with the whole block signed by a dependable third party. Typically, the third party is a CA that is trusted by the user community, such as a government agency or financial institution.

A user can present his public key to the CA in a secure manner to obtain a certificate. The user can then publish the certificate, and anyone who needs this user's public key can obtain the certificate and verify the key is valid by way of the CA.

The public-key certificate makes use of public-key encryption technology to protect and validate public keys. For this purpose, a user must apply to a CA to create the key. The user supplies his public key plus some sort of unique user identifier.

The public key and user ID, together with a CA identification, form the unsigned certificate. The CA then takes the hash code of this unsigned certificate. A hash code is a small block of data that serves as a sort of fingerprint. For all practical purposes, two different certificates will yield two different hash codes.

Next the CA encrypts the hash code with the CA's private key to produce the signature. A common public-key algorithm for this purpose comes from RSA Data Security. Because only the CA possesses its private key, only the CA could produce this signature. The CA attaches the signature to the certificate to form the signed certificate.

The user may supply this certificate to anyone who needs the user's public key. To verify that a public key is valid, the recipient recovers the hash code from the signature by decrypting the signature using the CA's public key.

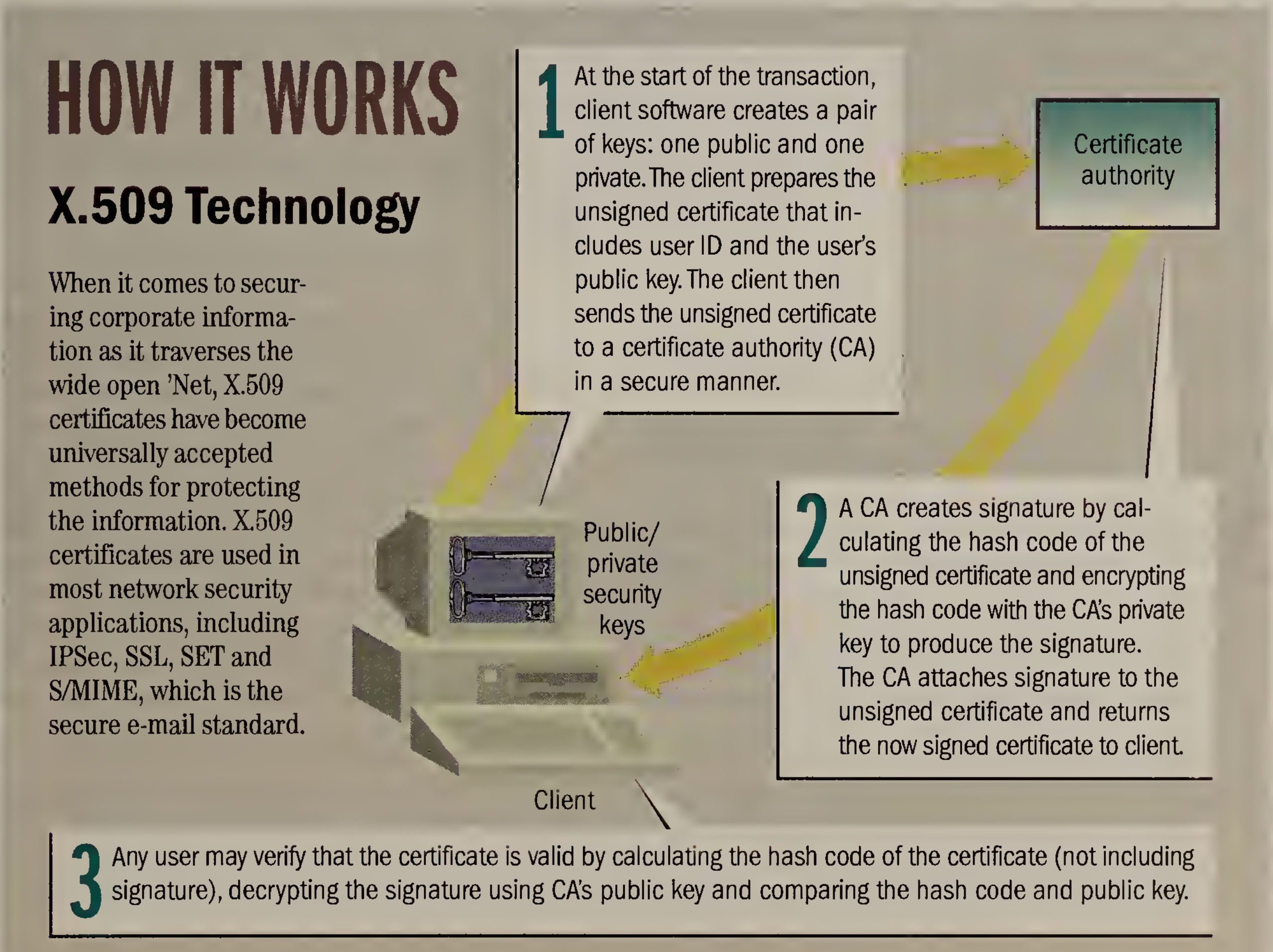
Then, the recipient calculates the hash code of the unsigned certificate and compares this to the hash code recovered from the signature. If the two codes match, this is a valid certificate and the recipient may trust that the public key in that certificate belongs to the identified user.

Additional features

In addition to the user's identifier, the user's public key and the CA's identifier, an X.509 certificate includes several other elements. The certificate contains an identifier of the algorithm used to sign the certificate and the period of validity of the certificate. The latest version of the standard, X.509v3, also includes an extensions field to provide more flexibility and to convey information needed in special circumstances.

Finally, X.509 provides a format for use in revoking a key before it expires. This enables a user to cancel a key at any time.

Stallings is a consultant, lecturer and author on data communications and networking topics. This article is based on material in his most recent book, Cryptography and Network Security. *He can be reached at ws@shore.net.*



HOW IT WORKS

X.509 Technology

When it comes to securing corporate information as it traverses the wide open 'Net, X.509 certificates have become universally accepted methods for protecting the information. X.509 certificates are used in most network security applications, including IPSec, SSL, SET and S/MIME, which is the secure e-mail standard.

1 At the start of the transaction, client software creates a pair of keys: one public and one private. The client prepares the unsigned certificate that includes user ID and the user's public key. The client then sends the unsigned certificate to a certificate authority (CA) in a secure manner.

2 A CA creates signature by calculating the hash code of the unsigned certificate and encrypting the hash code with the CA's private key to produce the signature. The CA attaches signature to the unsigned certificate and returns the now signed certificate to client.

3 Any user may verify that the certificate is valid by calculating the hash code of the certificate (not including signature), decrypting the signature using CA's public key and comparing the hash code and public key.

EDITORIAL *insights*

A challenge to the leading ISPs

Last month, I told you about the ISP Showdown we'll be staging at the upcoming Internet World show. Now, after talking with readers, analysts and vendors, we've chosen the companies that will be showcased in this special presidential-style debate.

I'm challenging WorldCom, MCI/Cable & Wireless (C&W), PSINet, GTE Internetworking, AT&T and IBM Global Services to send a CEO or top technical executive to take part in the debate. The vendors have until Wednesday, Aug. 26 to confirm their participation in the ISP Showdown, which will be held from 2:30 p.m. to 4 p.m. on Monday, Oct. 5 in New York. (No, we're not giving MCI/WorldCom double billing here. In seeking approval for its merger with WorldCom, MCI agreed to sell key Internet assets to C&W. The companies may send a current MCI or C&W executive to represent C&W.)

If any vendor declines or misses the deadline, we'll challenge another top ISP. But, so far, no company has refused to take part in one of our debates, and this is our fifth such event.

During the Internet World ISP Showdown, the ISP executives will first answer questions from a panel of experts. Our panelists will be Denise Pappalardo, a *Network World* senior editor with plenty of experience covering the ISP beat; Greg Howard, director of service provider programs with market researcher Infonetics; and Johna Till Johnson, director of META Group's Global Networking Strategies Service.

After the experts fire away, our vendor panelists will ask each other questions. Finally, the audience will get to grill the suppliers. There are no formal presentations, and there's a strict time limit on answers. The format is designed to cut down on marketing blather and help corporate Internet access buyers like you understand the real differences in vendor strategies.

Choosing participants is subjective, but after researching the companies and talking with experts, we think these companies represent a good cross section of market leaders and opinion shapers.

Two things remain. First, we need your ideas on what to ask the companies. What worries you about pricing, service-level agreements, virtual private networks and other Internet access issues? Second, we need to hear back from the vendors. So, WorldCom, MCI/C&W, PSINet, GTE Internetworking, AT&T and IBM Global Services, are you up to the challenge?

John Gallant jgallant@nww.com

IT planning • Jeffrey Kaplan

Raising your net mgmt. project batting average

A recent front-page article in *The Wall Street Journal* titled "Why some firms de-engineer" profiled a series of failed IT projects that cost their companies significant dollars and manpower. Many organizations have experienced similar problems implementing network management platforms.

As a result of these failures, the article suggested, the pendulum is swinging away from big-ticket IT initiatives and toward more modest, focused projects with a greater likelihood of success. If this movement does represent a genuine trend, then the bloom may finally be off the rose when it comes to the hype associated with how IT transforms the way organizations do business and how network management platforms fulfill users' requirements.

Estimates of IT project failure rates vary, but none are encouraging. Chief information officers surveyed this year by CSC Index estimate that half of the IT projects they initiated have failed. A Standish Group survey, also conducted earlier this year, found that 42% of IT projects are abandoned. Probably the most discouraging estimates come from Gartner Group, which claims that over 70% of network management projects fail to meet their original objectives.

What's behind these failures?

There is no question that the IT/networking industry is plagued by a disproportionate amount of hype that has generated plenty of unrealistic expectations. Every CIO and IT manager fears the day that the CEO returns from a business trip with an in-flight magazine tucked under his arm and a head full of great ideas about how IT can transform the organization.

What's missing is a structure and process to accommodate and evaluate these corporate flights of fancy, along with more realistic project plans to implement new technology in a methodical fashion. A surprising number of organizations still don't have a formal link between the IT or networking group and the end-user business units. The only interaction between the two groups is reactive.

Among those few organizations that recognize this problem, many still lack the process and project management skills to see their IT or networking initiatives through to completion. Most IT and networking professionals are engineers who favor logical, step-by-step work. While this attribute is useful to ensure the disciplined execution of a project plan, it falls short of meeting the real-world challenges to IT and networking projects today.

Gartner Group claims the challenge of network management projects, among the most demanding IT efforts, is only 25% technical. The other 75% of the challenge is process-oriented or organizational in nature. Fitting the IT or network management solution into the business takes more than fitting the technical solution into the existing IT environment. Gartner suggests that every dollar spent on process improvements generates another four dollars in productivity improvements for the overall organization.

What kinds of process improvements are required? Start by documenting current operating procedures and behaviors to identify what works and what doesn't. Next, examine the linkages among the IT group, end-user business units and external vendors and service providers. Then determine where the gaps exist and how they can best be filled with new policies and procedures that fit the corporate culture of the overall organization.

By developing a collaborative environment and building the associated process and project management skills, organizations will become more selective. Therefore they will initiate IT and networking projects that have a greater likelihood of success because they are a better fit for the overall organization.

Kaplan is the director of strategic marketing for International Network Services, a network services company based in Sunnyvale, Calif. He can be reached at his Boston-area office at (617) 376-2450, Ext. 236 or at jeff_kaplan@ ins.com.

MESSAGE QUEUE

Send letters to nwnews@nww.com or John Gallant, editor in chief, Network World, 161 Worcester Road, Framingham, MA 01701. Please include phone number and address for verification

Just say no

Regarding your article "Competition takes a hit" (Aug. 3, page 1):

I agree with those who do not look forward to the proposed Bell Atlantic/GTE merger. As a GTE customer, I wonder each month why my local phone bill is so high for such a low-technology service as plain old telephone service. True, I always have a dial tone and there is rarely a busy signal, but these are the things that have been established, at least for me, as the norm.

Articles written by people who know a lot more than I do

Yankee Ingenuity • *Howard Anderson*

Controlling Windows NT is a constant battle

Here's your problem: You're trying to lower the total cost of ownership (TCO) of your network. But just when you think you're making progress, every bozo in your company has some hairbrained NT idea that threatens to sabotage your plans.

Your end users are continuing to add Windows NT to their systems, which may or may not increase your TCO. The divisions keep driving you nuts because they are putting each application they buy on a different NT server, and each workgroup has its own ideas — all of which revolve around new NT applications that have to talk to one another. The more complex it gets, the more the network is strained and the more resources you need to keep your customers from going from sullen to mutinous.

MARTY BRAUN

You would like to say, "Hey, the network is up 99.99% of the time and my TCO is decreasing." In reality, you will be lucky if TCO doesn't increase. And to add to your headaches, your network customers don't give a damn if your network is up 99.9999% of the time if their applications don't run; and it isn't always crystal clear exactly why an application isn't running.

Your users bought into NT because it was so cheap — about 30% of what it would cost your firm to go to a muscular Unix solution. Of course, no one thought of the scalability issues or that you probably needed NT Enterprise class, which is vanilla NT on steroids. And yes, it costs more.

So you are going postal. You want to take your end-user friends out behind the barn and have this little conversation with them: "Hey, Mr. Big Shot Department NT Honchos! Yeah, you, dummies! Your cost is lower, but mine is higher! You are going around bragging about your new NT solution and how much you saved the company and how smart you are! Well, let me tell you something. To make you look good, we in networks are going to look awful. We are going to need more people, more tools and more money — and even then network performance is going to drop! Now I have to support even more devices. Not only that, but availability isn't what you want it to be, and to make my life more miserable, you have decided to turn over your bevy of servers to us in corporate networks because the number of users is approaching 1,500! Thanks a lot, fellas!"

Honk if this sounds familiar.

The most glaring NT shortcoming you are going to encounter is directory services, which should be fixed sometime before you retire. You will also have a snit fit if you expect the Gigabit Ethernet network interface cards in your NT servers to run anywhere close to line speed. NT 5.0 will take care of this, supposedly. What else? Well, Microsoft's Steelhead routing code turns out to be a dead fish. You certainly aren't going to get rid of your Cisco routers or even let your servers double as routers in your smallest of remote offices. So what do you have? A bunch of issues dealing with stability and scalability and some suggestions that you might not want NT for hardcore networking.

But you may not have a choice because corporate is adopting NT and NT Extended edition like the New York Yankees adopt pitching.

Now how do you handle Windows NT 5.0 when it finally arrives? One of the key issues is support. Although everyone in the world seems to be adding support people, Microsoft is not. Instead, Microsoft relies on third parties for support, except for some very valuable enterprise customers who can be marquee clients and convince everyone else in the industry that NT works just fine. For the rest of the corporate users, here are a few words about protecting your rear.

First, if you want to know who is going to support NT, look in the mirror. And it won't be cheap. Operations costs always make up the lion's share of TCO — 60% to 70% of the total budget for your network computing environment.

Second, expect as much as 40% of your operating systems to be NT by this time next year and that it will probably cost $3,000 per seat to support users. Yes, I know you think that your proprietary computer solutions are down around $1,800 and even Unix is about $2,400. But remember that you bought into client/server solutions because the licenses and hardware were cheap. The Lord giveth and the Lord taketh away.

Third, your router networks can help — and hurt. NT uses TCP/IP. But wait, that means Dynamic Host Configuration Protocol (DHCP), Domain Name System (DNS), renumbering networks and so on. You don't have to worry about this with IPX. Microsoft's DHCP and DNS tools are good, but expect headaches implementing and ironing out the bugs.

NT and all the intranet stuff it fosters were supposed to lower your TCO. Reducing the number of protocols and making everything TCP/IP will lead to lower complexity and lower operations cost, right? Liar, liar, pants on fire! Add lots of NT, and you'll discover NT servers in places you never knew about — and find yourself in deep doo doo.

Anderson is founder and president of The Yankee Group, a Boston-based consultancy. He can be reached at handerson@yankeegroup.com.

about the telecommunications industry indicate that the current rates for local phone usage are bloated by "phantom expenses." That is, the phone companies are actually allowed to indicate internal charges where no real money changes hands. With this in mind and knowing that any merger, friendly or otherwise, will entail additional costs to both parts of the new organization, I am concerned that I will receive less service and end up with an even higher phone bill. And I won't have done a thing to deserve it!

The telecommunications industry was broken up years ago to spur competition and lower prices. In some cases, mostly in long-distance calling, this happened. But local carriers still maintain a stranglehold on my choice of carrier and limit my ability to lower the cost of a service I use infrequently. Going back to the old way with fewer competitors will not bring us closer to those original goals. I say not just "No!" to this merger, I say "Heck, no!"

Rick Curry
Dallas

Well-balanced

I enjoyed your recent special report on the National Security Agency and encryption technology ("The long, strong arm of the NSA, July 20, page 1).

As a former worker bee in the "No Such Agency" days, I have some personal experience with the bureaucracy. Your article seemed exceptional to me for one outstanding reason: It was relatively balanced. This is something I rarely see on this topic — most coverage takes the easy, scary, big-brother-is-watching approach. Your article seemed to present the facts (the Agency does lean on vendors, and it ends up costing money) without the popularized hype. I appreciate the products of professional, objective reporting.

I think most people do not trust the government, to varying degrees. The abuse of power is a real issue. This makes the NSA and its tactics, as well as concerns over exporting technology, a more complex issue than many people realize.

John Brown
Network engineer/consultant
CD Group
Atlanta

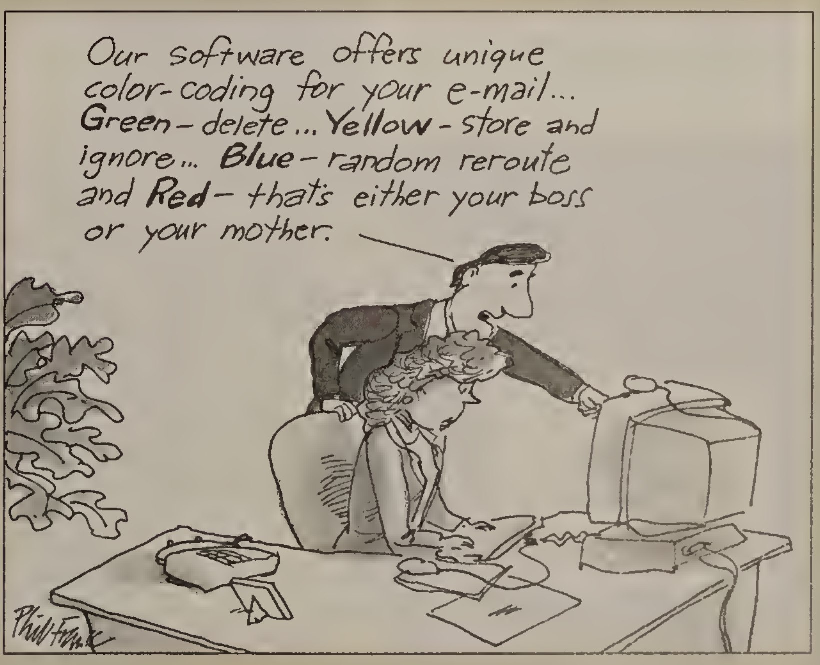
Welcome to the fray

Controversy surrounds the technical details and general availability of Sprint's Integrated On-Demand Network ("Sprint doubts own ION plans," July 13, page 1). TeleHub Technology welcomes Sprint to the voice-over-ATM revolution; it has reached the only practical, usable and secure answer to implementing and delivering high-speed fast packet service today.

The Virtual Access Services Platform developed by TeleHub was the first, and is still the only, national ATM backbone handling integrated voice and data services on the U.S. public switched telephone network. Those who doubt Sprint's ION economics and rollout plans seem stuck at 28.8K bit/sec dial-up modem speed. Maybe they and others can wait another five years; Sprint and TeleHub think the time is now.

Howard Gunn
Director of applications engineering
TeleHub Technology
Gurnee, Ill.

Teletoons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Phil Frank

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YLBWN

No pain, no gain

Though difficult to deploy and complex to manage, desktop management suites have the power to simplify your network administration tasks.

By Mark Gibbs, Network World Test Alliance

JOEL NAKAMURA

We labored through some pretty tricky installation and configuration drills to get a line on today's desktop management suites. In the end, the market share leader, Intel's LANDesk, took home our Blue Ribbon for its easy installation and wide range of features. We also tested products from Hewlett-Packard, Seagate Software and Tally Systems, and we previewed beta versions of two of the most anticipated new releases from Microsoft and Novell. You'll find the full test results for all six products in our Review below.

Our Issues and Trends Story on page 36 highlights which features to insist on, in key areas such as inventory, software distribution and license metering. We also look at new developments in the marketplace and efforts to standardize the collection of management data.

For a comprehensive look at what's available today, see our Interactive Buyer's Guide Chart on Network World Fusion (www.nwfusion.com). It lists the features of nearly a dozen desktop management suites, and helps you find the solution that's best for your network.

REVIEW

If you've ever joined a gym, you've probably been admonished to work harder — no pain, no gain. The same maxim applies to desktop management products, the tools that provide centralized support for network management functions such as hardware and software inventory, software distribution and license metering. Deploying them is neither simple nor cheap, but they can make your life easier and your work more cost-effective.

All of the products we looked at work well and get the job done satisfactorily, for the most part.

Our Blue Ribbon winner is Intel's LANDesk Management Suite 6.1. It was easy to install and has adequate documentation, an excellent range of features and a well-organized user interface.

Hewlett-Packard's OpenView Desktop Administrator (DTA) 4.0 embodies a grand concept, offering hierarchical data collection geared for multisite enterprise use. The unique communications scheme allows staging of data collection and distribution operations so a network doesn't get overloaded. Data transfer among sites is mediated either by direct access via shared drives; TCP/IP using a proprietary HP protocol; or File Transfer Protocol, which requires that the target server be an FTP server.

While the scope of HP's DTA is impressive, the product is slow and we found the documentation to be unclear and poorly organized.

Seagate Software's Desktop Management Suite (DMS) 3.0 is more a collection of bundled utilities than an integrated system. That said, everything works well if you can get past the disorganized

Net Results

NetworkWorld Blue Ribbon	**LANDesk Management Suite 6.1** *Intel* *(800) 538-3373* *www.intel.com/network/suite*	**OpenView Desktop Administrator 4.0** *Hewlett-Packard* *(408) 447-3160* *www.openview.hp.com/dta*	**Cenergy** *Tally Systems* *(603) 643-1300* *www.tallysystems.com*	**Desktop Management Suite 3.0** *Seagate Software* *(408) 438-6550* *www.seagatesoftware.com/dms*
PROS	▲ Good user interface ▲ Easy to use	▲ Heirarchical data replication designed for large sites ▲ Can install Macintosh applications	▲ Excellent Windows application distribution	▲ Excellent Windows application distribution
CONS	▼ Unsophisticated software distribution	▼ Slow performance ▼ Weak documentation	▼ Poorly integrated	▼ Poorly documented ▼ Individual utilities are poorly integrated

documentation.

Like Seagate's DMS, Tally Systems' Cenergy consists of a collection of bundled utilities. The programs do the job, although the suite's range doesn't include desktop configuration, antivirus or remote control. In addition, Tally doesn't have its own application distribution tool. Instead, the company bundles Seagate's WinINSTALL with the Cenergy suite.

We also looked at two beta products that show considerable promise (see story, page 35). Microsoft's Systems Management Server 2.0 beta employs a hierarchy of management servers and uses a simple and effective management interface. Novell's ManageWise 2.6 beta is a transitional release that builds on a solid foundation. Both products would have scored higher than our Blue Ribbon winner, but we don't rate beta products.

In for the count

All of the products provide client hardware and software inventory functions that work well. There is little to distinguish the products in this category, other than the look and feel of the user interface. We appreciated the well-organized Intel LANDesk interface, which allows users to simultaneously examine multiple clients in separate windows.

LANDesk's inventory system also supports custom forms, which prompt users to interactively enter custom data.

Because inventory tends to produce huge amounts of data, make sure you choose a database and platform that can handle your needs. All the products we tested can inventory DOS, Windows 3.X, 95 and NT machines. Seagate's DMS also supports Macintosh, while LANDesk and the NetCensus component of Tally's Cenergy suite include OS/2 as well.

HP's DTA has the most limited range of client support, but it does include the ability to test client systems. For example, you can benchmark CPUs, test memory and collect PC vendor-specific information such as a serial number.

One of the most complex tasks the products attempt is software distribution. All can handle Windows 95 and NT; none deal with OS/2 installation; and only DTA tackles Macintosh.

All the products provide a huge range of options and tools for remotely installing software. These tools include automatic installation at start-up, scheduled installation and interactive installation controlled by the user (a "pull" system). Seagate's DMS is the only package that offers installation via e-mail (Microsoft Mail, Lotus' cc:Mail, DaVinci Mail, Lotus Notes and Digital's TeamLinks), but it doesn't provide support for Simple Mail Transfer Protocol/Post Office Protocol 3.

The easiest software distribution system to use is Intel's LANDesk. However, LANDesk doesn't allow detailed tailoring of installation packages, while Seagate's DMS and HP's DTA support scripting and control of every aspect of installation.

LANDesk and DMS distribute software by "watching" the target package application being installed. This requires a clean PC — one that has nothing but the operating system on it — on which the monitoring program executes the installation and records its actions. The application can then duplicate the changes on other clients.

Without a doubt, DMS provides the most sophisticated software installation. The fact that its WinINSTALL program is licensed by other desktop management system vendors indicates it's a market leader.

License metering is handled well by all of the products. LANDesk adds tracking of Dynamic Link Libraries, so applications that run from DLLs that are launched by a shell .exe file can be correctly monitored.

Score Card

	NetworkWorld Blue Ribbon LANDesk Management Suite	OpenView Desktop Administrator	Cenergy	Desktop Management Suite
Hardware inventory (10%)	9 x .10 = .90	7 x .10 = .70	9 x .10 = .90	6 x .10 = .60
Software inventory (10%)	9 x .10 = .90	8 x .10 = .80	9 x .10 = .90	8 x .10 = .80
Licence metering (10%)	9 x .10 = .90	9 x .10 = .90	9 x .10 = .90	9 x .10 = .90
Software distribution (10%)	5 x .10 = .50	8 x .10 = .80	9 x .10 = .90	9 x .10 = .90
Desktop configuration (10%)	1 x .10 = .10	9 x .10 = .90	1 x .10 = .10	1 x .10 = .10
Management/alerting (10%)	9 x .10 = .90	5 x .10 = .50	8 x .10 = .80	7 x .10 = .70
Integration (10%)	9 x .10 = .90	9 x .10 = .90	6 x .10 = .60	6 x .10 = .60
Reporting (10%)	9 x .10 = .90	9 x .10 = .90	9 x .10 = .90	9 x .10 = .90
Client support (5%)	9 x .05 = .45	9 x .05 = .45	9 x .05 = .45	8 x .05 = .40
Antivirus (5%)	9 x .05 = .45	1 x .05 = .05	1 x .05 = .05	1 x .05 = .05
Remote control (5%)	9 x .05 = .45	1 x .05 = .05	1 x .05 = .05	7 x .05 = .35
Documentation (5%)	8 x .05 = .40	5 x .05 = .25	6 x .05 = .30	2 x .05 = .10
Total	7.75	7.20	6.85	6.40

Individual category scores are based on a scale of 1 to 10. **Percentages** are the weight given each category in determining the total score.

MORE ONLINE

8425

- **A sidebar citing desktop management cost/benefit studies**
- **Desktop management resources**
- **How we did it and product pricing**

Tell me about it

All of the products provide event notification, alerting administrators when all of an application's licenses are being used, for example. Tally's CentaMeter is the least elaborate — it simply logs events in a database and offers no warning mechanism, such as a pop-up box or mail message.

Seagate's DMS has three methods of notification: e-mail via cc:Mail and Microsoft Mail or Exchange; NetWare broadcast; and SNMP trap generation. DMS alerts are generated when user-selected fields in the inventory database change.

HP's DTA and Intel's LANDesk offer more sophisticated, highly configurable event handling and alert generation. DTA has eight methods, including trouble-ticketing using HP's Remedy product; serial port access; text-to-speech generation; and sound files. LANDesk also features eight notification options, including loading a NetWare Loadable Module, sending e-mail by SMTP and displaying a message box. With DTA and LANDesk, you can create alerts when SNMP traps and desktop management system events occur.

Only DTA supports desktop configuration. You can create and enforce very detailed configurations of Windows 95 and NT down to which applications, program groups and folders users can access, and what rights they have to alter them.

Surprisingly, only LANDesk includes antivirus support. The other products don't even discuss the issue, despite the potential to spread viruses through automatic software distribution.

The antivirus support as bundled with LANDesk is really more of a teaser than a true safeguard. It only supports Windows 95 and NT. If you want to include DOS and 16-bit Windows clients, you'll have to purchase Intel's comprehensive LANDesk Virus Protect Server.

All the products tested except Tally's Cenergy have some kind of remote control capability for viewing and controlling PCs. The remote control support in Seagate's DMS and HP's DTA is weak compared with LANDesk. Seagate delivers remote control through a bundled version of Funk Software's Proxy, which only supports DOS, Windows 3.X, 95 and NT. DTA's remote control software is actually Symantec's Norton pcAnywhere, which is sold separately.

LANDesk's remote control support is very good and allows you to reboot PCs, run text-based chat sessions with the PC's user, transfer files and launch applications on the user's PC from the console. You can also see the PC's screen and send keystrokes to it. It supports all flavors of Windows, OS/2, MS-DOS 5.0 or later, NetWare 3.X. and 4.X, and Macintosh.

First things first

To reap all the management benefits detailed above, you must first labor through a complex installation procedure that requires advance planning. Unfortunately, the products' documentation is of limited help in all cases; it ranges from LANDesk's merely good to DMS' poor.

All of the products support Windows 95, NT and Macintosh clients for at least some functions. Only Seagate's DMS doesn't handle OS/2. Intel's LANDesk doesn't support Windows 98 yet, but it's the only product to support Unix.

The connection between the clients and the servers may be IP, IPX or NetBEUI. Most products in this market support all three protocols. The databases used by all the products include Oracle, Microsoft SQL Server and generic Open Database Connectivity. LANDesk and DMS also support Sybase's SQL Anywhere.

While minimum server requirements are relatively modest, the fact is you'll need speed. Once you start to manage a network of 100 or more nodes, database operations will chew up as many cycles as you have. In our tests, LANDesk had the fastest console by far, while DMS ground away on even the simplest tasks.

On the client side, each product's agents can impose a significant performance impact. For example, during an inventory scan or software distribution, the agents can slow down a client when a user is trying to do other work. Most other agent operations are transparent, as they are conducted in the background or are too quick to notice.

If we were looking for the perfect desktop management system for a mid-size network, we would opt for Intel's LANDesk. For a large multisite management system, it would be hard to beat the hierarchical replication architecture of HP's DTA. In both cases, however, we'd like to use Seagate's WinINSTALL for software distribution.

Before you select one of these desktop management products, we advise running extensive tests and taking a long, hard look at how each product's architecture integrates with your network. There's a lot of heavy work involved in implementing one of these. But don't let that scare you too much; the savings in time and money and the improved manageability of your network will make the pain worthwhile.

Gibbs is a Network World *contributing editor, editorial advisor to Intranet Magazine, and a marketing and technology consultant. He can be reached at mgibbs@gibbs.com.*

Gibbs also is a member of the Network World Test Alliance, a cooperative of the premier reviewers in the network industry, each bringing to bear years of practical experience on every review. For more Test Alliance information, including what it takes to become a member, go to www.nwfusion.com/alliance.

Coming soon to a network near you

We checked out beta versions of Microsoft's Systems Management Server 2.0 (SMS) and Novell's ManageWise 2.6. These are impressive systems and will deserve serious consideration upon their release.

SMS 2.0 Beta 1 is a major upgrade, and it corrects many of the deficiencies of the previous release. It sports new administration and client interfaces, improved reporting and monitoring, new hardware, software and network topology discovery tools, a network problem solver, better software distribution and metering, and improved performance.

At this stage of the beta, properly assessing the product is difficult because not all of the pieces are there yet. For example, in this beta only Windows 95 and NT are supported, while support for 16-bit versions of Windows, OS/2 and Macintosh are planned for the final release. NetWare documentation and Novell Directory Services (NDS) support are also lacking, as is interoperability with SMS 1.2 and Alpha server support.

Microsoft has designed SMS with enterprise operation in mind. The system supports a distributed hierarchy of management servers with the ability to establish different levels of control for managers of network subsections. For example, a manager can be given the right to use the remote control feature but not to create software distribution packages.

SMS requires Microsoft's SQL Server for the back-end database. In this release of SMS, Microsoft SQL Server 6.5 is included for the first time, and its installation and configuration (a real pain if you're not familiar with SQL Server) are fully integrated as part of the installation.

The SMS interface is a Microsoft Management Console snap-in and provides access to all of the management functions. The client agent is one of the least obtrusive of the products we tested and stays invisible until user input is required — for example, as part of software distribution or when authorizing a remote console session.

Software distribution has been enhanced in SMS 2.0. Network managers can distribute software to specific users, groups and network segments. SMS 2.0 also supports distribution over slower wide-area links.

The other part of Microsoft's desktop management strategy for PCs running NT 4.0 Workstation is the Zero Administration Kit for Windows (ZAK). (For a complete review of ZAK and Novell's ZENworks, see *NW*, July 13, page 51.) This free kit is described by Microsoft as "a set of methodologies" and focuses on creating desktop configurations that are suitable for the skill level and job objectives of individual users. ZAK is actually a wizard-type process that creates logon scripts and control files that set up target workstations.

ZAK is complex, and there are many applications that will be hard to deploy using the system. Even Microsoft Office, a key focus of ZAK, requires updated Dynamic Link Libraries to allow successful ZAK deployment. ZAK is an interesting product that should appeal to organizations with a large base of Windows NT Workstation clients.

Overall, Microsoft SMS 2.0 is a powerful product, and organizations that are mainly Microsoft-based will find the product to be an excellent fit with their installed base.

New from Novell

Novell hasn't been idle either in the management arena. ManageWise 2.6 is a significant upgrade. However, the product is in a transitional state, thanks to the advent of Novell's new ZENworks product for desktop management. The two products duplicate some functions. For example, they both perform hardware and software inventories, but they do different things with the data they capture: ManageWise stores the inventory data in a separate database, while ZENworks stores its data in NDS. Neither shares the other's data.

If you deploy both products (ManageWise for network management and ZENworks for desktop management), running operations such as inventory twice might create a significant overhead issue — the hardware scan that required five minutes per day for each PC will now consume 10 minutes. Multiply that by 1,000 machines, and we're talking 20 man-days per day of lost time, not to mention the contingent bandwidth loss. Judicious scheduling would lesson the impact, but that's not the sort of planning you really want to have to do.

Novell's ManageWise product manager told us that the company expects to coordinate and integrate the two lines with product releases in the first half of next year.

ManageWise 2.6 is actually a lot more than a desktop management system. It includes network discovery, mapping, packet capture and analysis, and other general network management features. While this is impressive, it is the tie-in with NDS that makes the product outstanding. The integrated view of the network provided by NDS — particularly with the addition of NDS for Windows NT — and augmented by ManageWise, is something no other vendor offers.

But it is ZENworks that is the real icing on the cake. ZENworks is a plug-in for the NWADMIN utility and extends the objects in NDS. For example, users can deploy policy packages through ZENworks and NWADMIN to different parts of the NDS tree. This means that a package designed for one locale or business unit is easily associated with the machines in the group. The same mechanism applies to application distribution.

Despite the transitional issues, ZENworks and ManageWise 2.6 are impressive products. For IT shops with a significant NetWare investment, they are probably the strongest and safest options available. And when ZENworks is fully integrated with ManageWise, Novell will have one of the premier mid-range network management systems available.

— Mark Gibbs

Hang up your sneakers

Desktop management suites can save you a lot of time on your feet, once you get past their complexity.

In management circles, the technique of running a department by physically going from desk to desk has a name: Management by Wandering Around.

In IT circles, a similar phenomenon can be seen; we call it Management by Rushing Around. Its subscribers can be observed scurrying constantly from user to user to fix, reconfigure, install and upgrade. And as anyone who has ever been involved in such an environment will tell you, it's an inefficient, taxing way to run a business.

ISSUES AND TRENDS

Deploying desktop management systems can help, but don't believe all the claims of simplicity, flexibility and functionality touted by vendors. The best products are incredibly complex, and they still can't do everything. A truly comprehensive solution is simply not available.

Of course, you can overcome any shortcomings by going outside the suite to bolster weak areas. However, multiple products raise integration issues, making it harder to manage the management systems.

A trend we've noticed lately is the convergence of products from the high and low ends of the market to a middle ground. For example, Novell's ManageWise 2.6 beta and Microsoft's System Management Server 2.0 beta incorporate features once found mostly in high-end products.

Suite news

We took a look at the current crop of desktop management suites and found that the products available today are pretty good, at best (see our review, page 33). Most can perform a majority of the most useful desktop management functions, including hardware and software inventory, software distribution, license metering, remote control, virus checking and event notification. But none can perform all of these functions superbly. Nor is it likely that a single simple solution will emerge tomorrow, given the fact that at the rate at which the PC market changes, management software vendors are aiming at a moving target.

That said, the challenge is how to find the best available solution for your network. While Windows 95 and NT client support is ubiquitous, Intel, Network Associates and Novadigm don't currently support Windows 98. Many vendors don't support the Macintosh, and only Intel and Network Associates offer Unix support.

The areas in which you'll get the most bang for the buck from desktop management packages are in software distribution and license metering. These functions are critical because application rollouts and upgrades are such major projects, and because the issue of license compliance has significant legal and financial implications.

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See how the suites stack up in the Buyer's Guide chart posted on Network World Fusion and available for download. In addition to the products we tested from Hewlett-Packard, Intel, Microsoft, Novell, Seagate Software and Tally Systems, you'll find information about the following desktop management suites:

- **NetWizard Plus from Attachmate**
- **AimIT Workgroup Edition from Computer Associates**
- **NodeVision Wizard from Knozall Systems**
- **Zero Administration Client Suite from Network Associates**
- **Radia Software Manager from Novadigm**

We've also compiled detailed product specifications from all 11 vendors to show how each product handles critical tasks. Our interactive questionnaire will help you choose the best product for your network based on the criteria you deem most important, including:

- **Server requirements**
- **Client support**
- **Integration support**
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- **Software distribution**
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- **Server monitoring**
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- **Cost**

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Software distribution is a complex, hard-to-manage function. One of the leading Windows software distribution solutions is Seagate Software's WinINSTALL, which is bundled with Seagate's own Desktop Management Suite, and also with other vendors' products, including Tally Systems' Cenergy suite.

When it comes to software distribution, look for customization facilities, extreme flexibility and access to every aspect of systems setup. Some of the products — for example, Novell's ZENworks and Seagate's WinINSTALL — can monitor an application installation to create a distribution package automatically. But be warned: This feature won't work for all applications, particularly those that make complex changes to the systems on which they are installed. This is where customization facilities are required.

License metering systems cover the basics very well. Where license metering solutions differ is in the alerts they generate and how the alerts are raised. In addition, some programs block users from launching applications when all available licenses are used up, while others allow users to temporarily exceed the license limits or to steal a license from someone already using one.

Comprehensive hardware and software inventorying are crucial when managing large PC populations. A simple test is to see how applications developed in-house are identified and whether the hardware inventorying system can discover more obscure add-on cards and video adapters.

Slow to standardize

While many desktop management products perform similar functions, they do so in very different ways. Some standards are emerging to encourage compatibility among different products. The most organized effort to date has come from the Desktop Management Task Force (DMTF).

The DMTF's Desktop Management Interface (DMI) aims to provide a framework for collecting and categorizing management data so products from different vendors can coexist. Initially, network managers were pretty enthusiastic. But six years down the line, DMI is struggling for life. Nonetheless, DMI is supported by almost all of the products in our online Buyer's Guide chart.

In early June, the DMTF took over the Web-Based Enterprise Management Initiative (WBEM) from BMC Software, Cisco, Compaq, Intel and Microsoft. WBEM will use Web browsers to monitor networks rather than more complicated SNMP management consoles. But vendors are at least a year away from shipping any WBEM-enabled products.

Sun isn't backing WBEM because it has its own Java-based solution that fulfills a similar role: Java Management API (JMAPI). Major vendors are hedging their bets; many have signed on to JMAPI in addition to WBEM. JMAPI is still young, so users will have to wait to see whether it will make an impact.

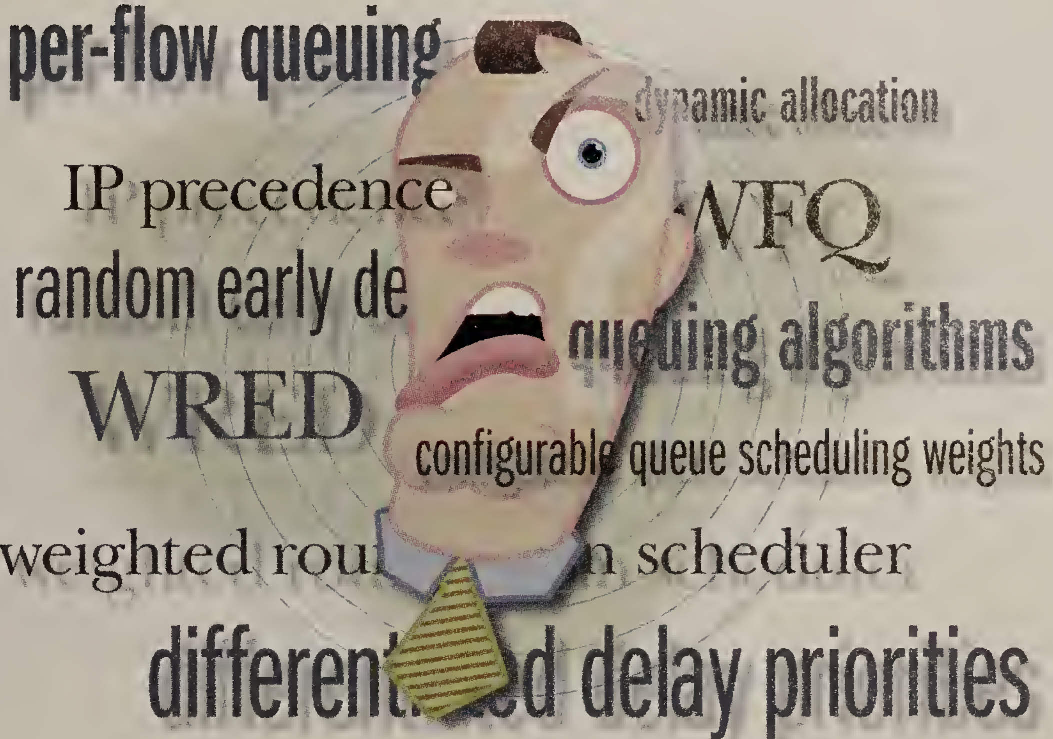
Another approach to desktop management is dealing with problems where they start — at the desktop. Vendors decided to try replacing a regular desktop PC with a stripped-down unit — a network computer, NetPC or Windows terminal — to save on management costs. However, the concept is struggling in the face of the sub-$1,000 clients that are flooding the market.

Although new approaches to and standards for network management are continually being refined, your best bet is to begin deploying a desktop management package today. In other words, don't wait for a cure-all that might never exist. The suite you choose won't solve every desktop management problem you have, but it will be better than the alternative: Management by Rushing Around.

— Mark Gibbs

FEATURE

Say what?



Our primer on quality-of-service capabilities translates technical gobbledygook into plain English.

By Eric Hindin

Most of you are familiar with quality of service (QoS), but would you be able to explain the concept's complex technical terms to a colleague using plain English? You may need to attempt this challenging task soon if you haven't already.

QoS is a way to allocate resources in switches and routers so data gets to its destination quickly, consistently and reliably. As applications increasingly demand high bandwidth and low delay, QoS is becoming a top purchasing criterion for internetwork hardware buyers and a key way for vendors to differentiate their products.

However, it's not always easy to understand the product literature. QoS has its own language, and vendors use a baffling array of terms and concepts to describe how their products provide this capability.

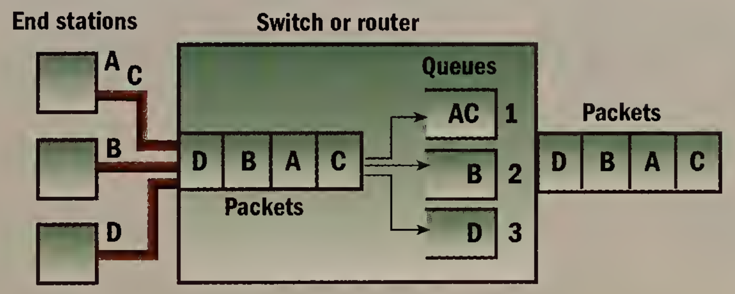
Consider this example from a press release for Cisco Systems' Catalyst 8500 switch: "The switching fabric supports per-flow queuing, differentiated delay priorities using a weighted round-robin scheduler for delay-sensitive applications, and differentiated loss priorities for managing congestion as well as traffic policing and shaping. The fast packet memory embedded in the switching fabric is allocated dynamically on a per-queue (flow) basis. This dynamic allocation, used in conjunction with user-defined queue thresholds and configurable queue scheduling weights, ensures that time-sensitive traffic is handled properly with no packet loss."

OK, got that? If so, you can stop here. If not, keep reading for a crash course in the QoS lexicon that will make it easier for you to understand various QoS capabilities and compare products.

There are only a few ways to provide QoS in networks. The simplest approach is to throw bandwidth at the problem, which is known as overengineering the network. QoS can also be provided using features and capabilities such as data prioritization, queuing, congestion avoidance and traffic shaping. Policy-based networking will one day tie all these features together in an automated system that ensures end-to-end QoS.

Overengineering is the simplest and, arguably, most effective means of ensuring QoS in the LAN. Pressure from competitors, new chip fabrication processes that allow a greater number of functions to be integrated into one Application Specific Integrated Circuit (ASIC) and newfound manufacturing efficiencies allow LAN switch vendors to continually offer faster products at prices comparable to existing ones. So it's not likely that overengineering will be replaced by other QoS alternatives any time soon.

HOW IMPLICIT AND EXPLICIT QOS WORK



Implicit QoS	End stations transmit packets (A, C, B, D). →	Incoming data is examined and prioritized. →	Data travels to next switch or router where the process is repeated.
Explicit QoS (RSVP)	End stations transmit packets' RSVP request. If accepted, packets (A, C, B, D) are transmitted. →	Incoming data is prioritized according to instructions from the destination node. →	Data travels to next switch or router where the process is repeated.

But if the QoS features under development for LAN switches could be deployed without costly hardware upgrades or complex changes to network management, network managers might be more inclined to consider implementing QoS systems rather than relying on overengineering.

Most likely, a combination of overengineering and QoS features will emerge as the solution of choice. Several vendors favor this approach, saying it's better to overengineer the network by throwing smart bandwidth, rather than raw bandwidth, at the problem. Of course, vendors are hardly objective: They use software capabilities such as QoS to differentiate their products.

In the WAN, overengineering is less practical. Declining WAN bandwidth costs will make higher speeds more affordable, somewhat mitigating the need for QoS in the WAN. However, WAN bandwidth costs will still be a significant expense for most corporations, so overengineered WANs will never be as prevalent as overengineered LANs.

Setting priorities

In lieu of overengineering, data prioritization and queuing systems provide the most mainstream QoS tools available today. Routers have supported data prioritization and queuing for many years. Some new Gigabit Ethernet switches are designed to support data prioritization and queuing, but policy-based management software to fully harness the technology isn't yet available. These new switches include 3Com's CoreBuilder 3500 and 9000 and SuperStack II, Bay Networks' Accelar models, Cabletron Systems' SmartSwitch Router, and Cisco's Catalyst 5000 and 8000.

Data prioritization systems can be characterized as implicit or explicit. With implicit QoS, a router or switch automatically allocates service levels based on administrator-specified criteria, such as the type of application, protocol or source address. Every incoming packet is examined or filtered to see if it meets the specified criteria.

Just about all routers support implicit QoS. Several switches also are designed to provide implicit QoS, but only offer limited prioritization capabilities. For example, the switches can prioritize based on type of virtual LAN and source or destination address rather than higher level information such as application or protocol type. Emerging policy-based network systems will bring more robust prioritization capabilities to these switches.

Explicit QoS, in contrast, lets the user or application request a particular level of service, and switches and routers attempt to meet the request. IP Precedence, also called IP Type Of Service (TOS), is likely to become the most widely used explicit QoS technique.

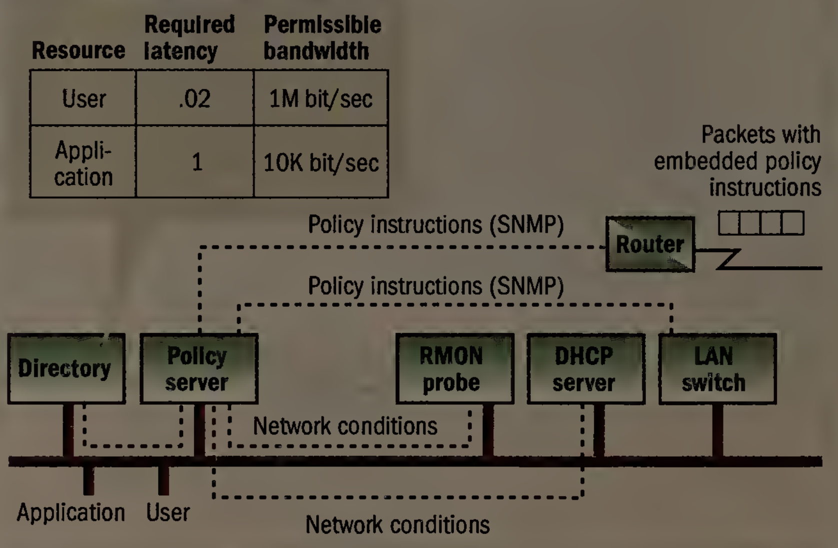
Part of the IP Version 4 protocol, IP TOS reserves a field in the IP packet where delay, throughput and reliability service attributes can be specified. The latest version of Winsock in Windows 98 and NT lets administrators use applications to set the field. With the exception of multimedia software, few popular applications support IP TOS.

The emerging Resource Reservation Protocol (RSVP) is more sophisticated than IP TOS. RSVP specifies its own signaling mechanism for communicating an application's QoS requirements to a router. Like IP TOS, RSVP has not been widely implemented by application vendors. Although some routers support RSVP, the protocol isn't considered mature enough for widespread deployment because of scalability concerns. RSVP imparts a significant processing load on routers and could cause performance degradation.

Implicit QoS is likely to remain more popular than explicit QoS for the foreseeable future. Implicit QoS doesn't require as much router processing. More important, any explicit QoS technique is a potential management nightmare. Given the chance, end users are likely to configure their software to ask for the best possible service level. Administrators would probably need to establish rules for users and perhaps even configure QoS on a per-user basis.

POLICY-BASED MANAGEMENT IN ACTION

This diagram shows the network hardware, directory and clients interacting with a policy server to provide policy-based management.



Resource	Required latency	Permissible bandwidth
User	.02	1M bit/sec
Application	1	10K bit/sec

Queuing up

Once data is prioritized using implicit or explicit techniques, queues and queuing algorithms are used to provide the appropriate or desired QoS.

Queues, which are simply areas of memory within a router or switch, are set up to contain different priority packets. A queuing algorithm determines the order in which packets stored in the queues are transmitted. The idea is to give better service to high-priority traffic while ensuring, to varying degrees, that low-priority packets get some service.

The graphic on page 37 shows basic implicit and explicit QoS systems. A queuing algorithm dictates that the queues are serviced on a round-robin basis. The algorithm specifies the transmission of two packets from Queue 1 (the high-priority queue) for every one packet transmitted from Queues 2 and 3. Same-priority packets are transmitted from within each queue on a first in, first out (FIFO) basis.

If congestion occurs, the queuing system does not guarantee crucial data will reach its destination in a timely manner; it only ensures that high-priority packets will get there before low-priority packets.

More sophisticated QoS systems solve this problem with bandwidth reservation systems, which assign prespecified amounts of bandwidth to individual queues or groups of queues. This ensures that bandwidth is always available for a high-priority queue. QoS is guaranteed unless the data in a queue exceeds the amount of reserved bandwidth. If this happens, the algorithms usually allow bandwidth from low-priority queues to service high-priority traffic, and vice-versa.

Basic queuing algorithms transmit packets from the same queue in a FIFO order. Large frames associated with a high-priority file transfer may delay a transaction processing application that passes small amounts of data, even though packets from both applications are classified as high priority.

More sophisticated queuing algorithms attempt to be fairer. For example, Cisco's weighted fair queuing (WFQ) differentiates among bandwidth-hogging applications and those that need less bandwidth, and distributes the bandwidth to all applications in equal amounts. Most router vendors have developed unique queuing algorithms and use their own terms to describe them.

One fundamental limitation of today's routers and switches is the small number of queues the devices have for QoS. While four queues are common, additional ones would facilitate more granular prioritization and greater fairness. For example, administrators could establish a queue to give preference to high-priority packets that need to travel to a far-flung destination.

Per-flow queuing establishes queues on a per-flow basis, which means each user session gets its own queue. The architecture has been implemented in switches based on MMC Networks' Anyflow 5500 chip set, including the Cisco Catalyst 8500 and Arrowpoint Communications' Content Smart Switch. But the trade-off associated with increasing the number of queues is greater complexity, which drives up costs and complicates configuration and management.

Clearing up congestion

Congestion control and avoidance mechanisms are other important aspects of QoS. Congestion control allows end stations to throttle their transmission rates and slow traffic if the network drops packets. TCP/IP and SNA have supported congestion control for many years. By itself, congestion control does little to ensure QoS.

However, congestion control becomes more powerful when it's paired with congestion avoidance. Congestion avoidance in the TCP/IP world is relatively new, but is fast becoming a standard feature in ISP- and carrier-class routers.

Random early detection (RED) has emerged as the standard congestion avoidance method. In basic form, RED randomly drops packets as queues fill up, causing end stations to decrease their transmission rates so queues won't overflow. Weighted RED (WRED) improves on RED by dropping packets based on IP TOS. Cisco's 7000 and 12000 series backbone routers and Bay's Backbone Node routers support RED and WRED, as will forthcoming ISP-class gigabit and terabit routers from start-up vendors such as Argon Networks, Inc., Avici Systems, Inc., Juniper Networks, Inc., NetCore Systems, Inc. and Nexabit Networks, Inc.

Shaping up packets

Traffic shaping refers to a variety of techniques for manipulating and modifying data to help ensure QoS, such as packet segmentation. One of the reasons ATM networks provide high QoS is because of their use of small packets, or cells. The maximum amount of time any cell can be delayed is the time it takes to transmit one cell.

Borrowing from ATM, router and switch vendors are adding segmentation capabilities to their products. Cisco's 12000 series routers internally segment packets across the backplane into 64-byte packets, which helps to ensure consistent QoS within the router. Several frame relay equipment vendors segment packets for transmission over WAN links as a means of ensuring predictable delivery and minimal delay.

Traffic metering is another form of traffic shaping. A number of protocols such as AppleTalk exhibit a tendency to transmit packets unevenly, which is sometimes known as creating trains of packets. Traffic metering spaces out the trains prior to transmission by temporarily storing packets in buffers to make sure the network isn't overloaded. Metering also can be used at the edge of a network to mitigate the effect of bursts.

Putting it all together

No matter which QoS capabilities a switch or router implements, the device works by itself to get data to its destination. For example, a packet could proceed through the first few devices and links with no problem, and then encounter a link that prevents proper QoS from being provided. Because the devices that the packet has already traversed function independently, they can't take steps to avoid the defective link.

But forthcoming policy-based management systems will ultimately tie all the QoS capabilities discussed above into one cohesive system to ensure end-to-end QoS.

Policy servers in conjunction with existing network monitoring and management software will monitor the network to determine optimum QoS settings and dynamically configure routers and switches.

The policy servers will also consult network directories such as Novell Directory Services to determine the appropriate service levels specific users and applications require. Policy servers and directories will typically use Lightweight Directory Access Protocol to communicate.

Policy servers still aren't available, but the products are expected to start shipping soon. Bay is scheduled to release a policy server next quarter based on its NetID TCP/IP address management software platform. Called Optivity Policy Services, the new product will work with Bay's Contivity Extranet Switches, Accelar Routing Switches and all Bay routers running BayRS routing software.

3Com also is expected by year-end to ship a stand-alone policy-based management system. Called PolicyPowered Networking, the product will work with 3Com's CoreBuilder 3500 and 9000 LAN backbone switches, SuperStack II LAN edge switches and PathBuilder WAN access and backbone switches.

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- **A white paper on QoS architecture.**
- **A guide to how data prioritization works.**
- **Details of switch vendors' policy-based management systems.**

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Cisco is scheduled to debut Cisco-Assure Policy Networking in the first quarter of 1999. The policy-based management system will support Cisco routers and Catalyst 5000 and 8000 LAN switches.

Cabletron pioneered the idea of policy-based management in 1994 when it announced SecureFast Virtual Networking. SecureFast wasn't successful in gaining market acceptance, but the technology will be incorporated in Cabletron's upcoming policy server. The company has not yet released a ship date for the new server.

It remains to be seen how easy to use and cost-effective these QoS systems will be. Proper network design is crucial to the success of your implementation. QoS is too costly and complex to implement everywhere, and even the most robust QoS capabilities can't overcome poor network design. In campus nets, it makes the most sense to implement QoS in the backbone. In WANs, QoS is better suited for the edge of the network.

Translating vendor-speak

Now that you know the QoS lexicon, the Cisco press release mentioned in the beginning of the story should make a little more sense. The statement means the Catalyst 8500 switch can place every user session in its own queue and can use a queuing algorithm such as WFQ to provide the most appropriate service levels to every flow. The switch manages congestion and also provides traffic policing and shaping.

Queues are created for every user session. All this, along with WFQ, ensures QoS.

Hindin is director of The Yankee Group's Network Solutions consulting service, which provides network planning and implementation advice to corporate network managers. He can be reached at ehindin@yankeegroup.com.

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Management Strategies

When worlds collide

Tips for communicating with a nontechnical boss who just doesn't seem to get it.

By Louise Fickel

What do you do when your boss understands so little about computer technology that he's willing to let temperatures in the network equipment room soar daily to 86 degrees? If you're John Appel, you show him that it would cost more to replace the network and company data than it would to install air conditioning.

Appel's strategy of educating his boss worked in that situation, but like many of his counterparts, he hasn't always been so lucky. He is now the director of IT operations at First Annapolis Consulting in Linthicum, Md., but Appel hit a brick wall several years ago when he worked as a systems engineer for a technology consulting firm.

The chief information officer there didn't think the firm's traveling consultants needed to install software or store data on the hard drives of their laptop computers, so he launched a campaign to lock the drives and therefore reduce support costs and eliminate computer viruses. As a former railroad company executive who had trouble turning on his own laptop, the CIO remembered how administrators at his previous company had used Windows NT to accomplish this."He just wasn't willing to listen," Appel says, so the IT department simply ignored his impractical suggestion.

Appel isn't alone in his experience of working for a boss who has little understanding of IT. Other networking professionals have their own horror stories.

Take, for example, the e-mail administrator at Greyhound Lines in Dallas whose manager refuses to acknowledge the role that network problems play in employees' loss of e-mail messages.

"When we explain that the problem was caused by a system glitch or a faulty setting, he says, 'It shouldn't have happened. You should have done your job better,' " the administrator says.

If such stories sound familiar, it may be because it is increasingly common for networking professionals to work for bosses who don't have a technical background.

"Over the last four years, the CIO position has seen an influx of people with backgrounds in business management," says Fred Magee, vice president and research director at the Gartner Group in Stamford, Conn. In the past 10 years, the ratio of CIOs with IT backgrounds to those with business backgrounds has shifted from 80/20 to 50/50, he says.

Working with what you've got

Although you're likely to work for a nontechnical boss at some point in your career, there are a variety of measures you can take to enhance the working relationship.

John Appel *understands the frustration of working for a boss who lacks a technical background.*

STAN BAROUH

At one end of the spectrum are basic management skills that rely on common sense. "Keep it from becoming antagonistic," Appel says. "Maintain a professional demeanor and don't resort to trying to diminish the other person's credibility."

"Recognize the situation from the very beginning," advises Greyhound's e-mail administrator. "If you try to ignore it, it will be a lot harder later. And always document what you're doing."

And how should you try to educate your boss? Try to reduce the amount of technical jargon and use broader terms to explain a complicated concept. Graphic representations, such as simple drawings of the network, are effective with people who learn visually. Giving someone a little hands-on experience can also work wonders. Consider bringing your boss into the network equipment room for a tour.

Explaining the technology in business terms is also useful. Plus, discussing technology in terms of meeting business goals will better justify its use for your boss and upper management. "Tell them, 'Here's how much we'll lose if we can't work for three days,' " Appel says.

The bottom line is keeping the lines of communication open, says Victor Danevich, managing consultant at International Network Services, a network consulting firm in Burlington, Mass. "Perceived value is extremely important," he says. "It's crucial that your boss understands where your time is being spent." Danevich recommends e-mailing status reports with an objectives list to the boss daily.

Learning the business means more than just talking. Since joining his company five years ago, the IS director at a Midwestern wholesaler of telecommunications devices says he and his boss have educated each other. "Maybe he didn't understand what ATM was, but he had the ability to grasp a basic understanding and then translate it to the next level up," says the IS director, who requested anonymity. " And I traveled with him to several of our distribution centers, so that he could teach me the business."

Personality issues also were important. "We first had to develop a trust of each other, so that he knows I'm not going to get him in trouble with my recommendations. And I know that he's going to provide the resources to do it right."

Since then, they've worked together to tackle a number of thorny issues. They recently convinced the company's chief financial officer to begin leasing PCs rather than buying more dumb terminals. His boss initially found it difficult to buy into the plan.

"As a businessman, it was hard for him to grasp the idea that a PC's life expectancy is about three years. He had always regarded equipment as tools to be used for years and years," the IS director says.

Educating his boss has paid off in other ways as well. "The biggest benefit is that IT is now a part of the planning process and a strategic weapon against the competition rather than a back-room accounting machine," he says.

Fickel is a freelance writer in Yellow Springs, Ohio. She can be reached at RiceKid@ix.netcom.

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Two positions are available for software engineers at Healtheon/ActaMed Corporation. Healtheon/ActaMed Corporation is an Atlanta based company which markets a healthcare related software product known as ActaLink. Candidates for these positions should possess a Master of Science degree in Computer Science. The position will involve the design, development and enhancement of GUI interfaces to be used by health care professionals to access data from a central patient database using C and C++ computer languages, SQL and relational database software, object-oriented and design methodology, and JAVA and HTML scripting. Applicants must have one year of experience with C and C++ programming, SQL and relational database software, object-oriented and design methodology, JAVA and HTML scripting and GUI applications. The starting salary for each position is $62,774. The Application should be submitted to Lois Rickard at Healtheon/ActaMed Corporation, 7000 Central Parkway, Suite 600, Atlanta, Georgia 30328.

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A position is available for software engineer at RelevantKnowledge - the leader in web measurements. The position will involve object-oriented design and development of web applications utilizing WebObjects, object-oriented business data modeling and database applications utilizing Enterprise Object Framework. Candidates should possess a Master of Science Degree in Computer Science, at least one year of experience with WebObjects and two years of experience with Enterprise Object Framework. The salary ranges from $62K to $75K. Submit resume to Andy Markham at RelevantKnowledge, Inc. 530 Means Street, Atlanta, Georgia, 30318.

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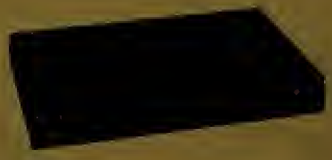

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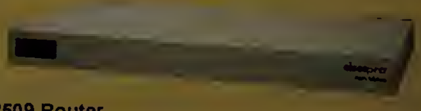

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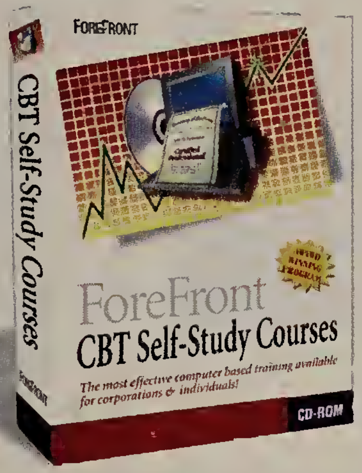
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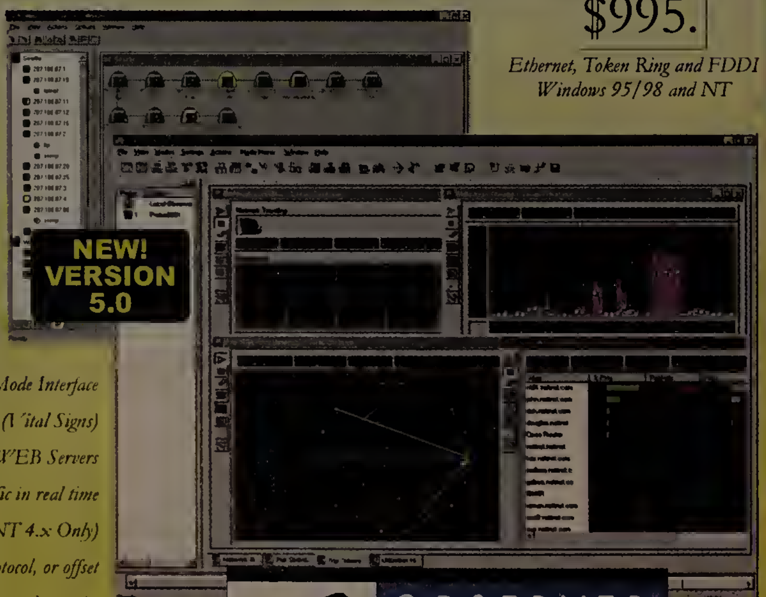

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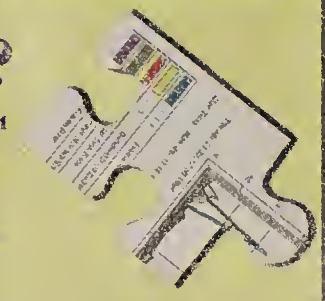

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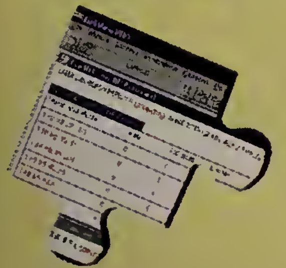

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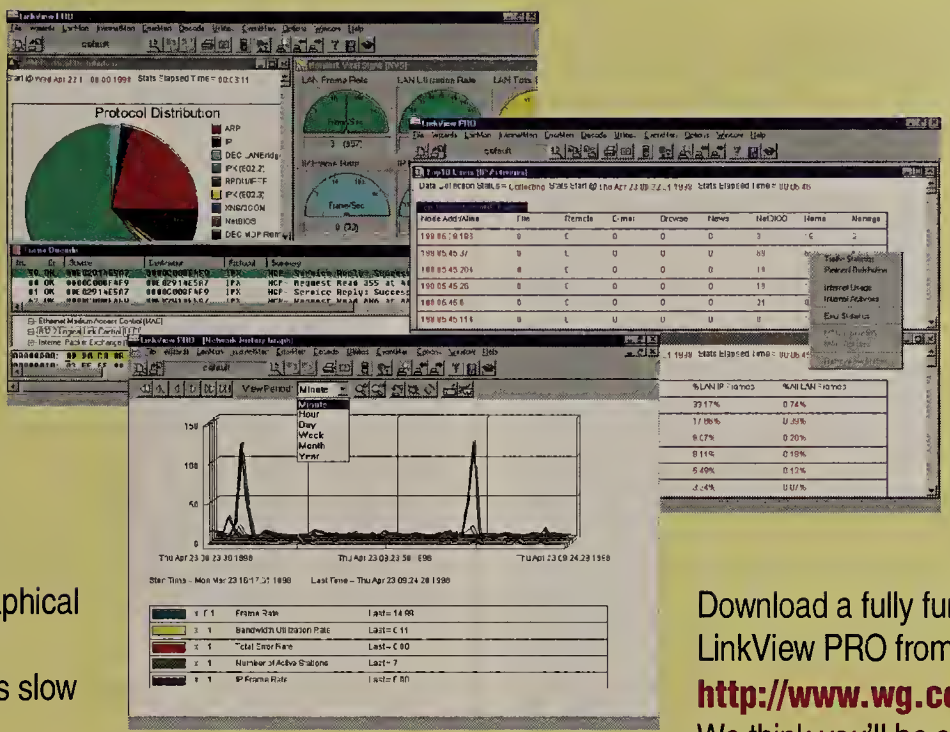

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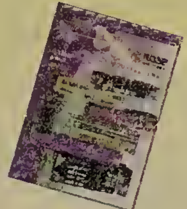

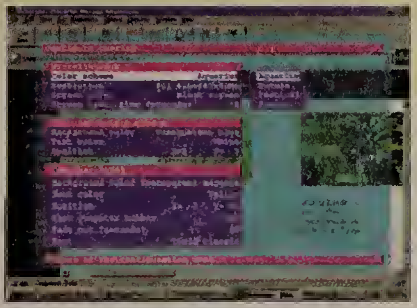

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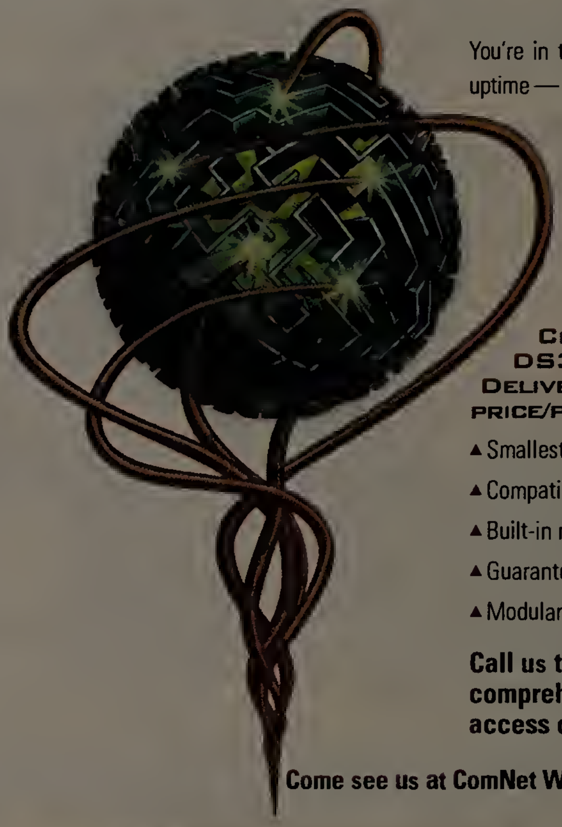

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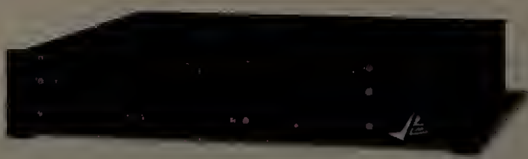

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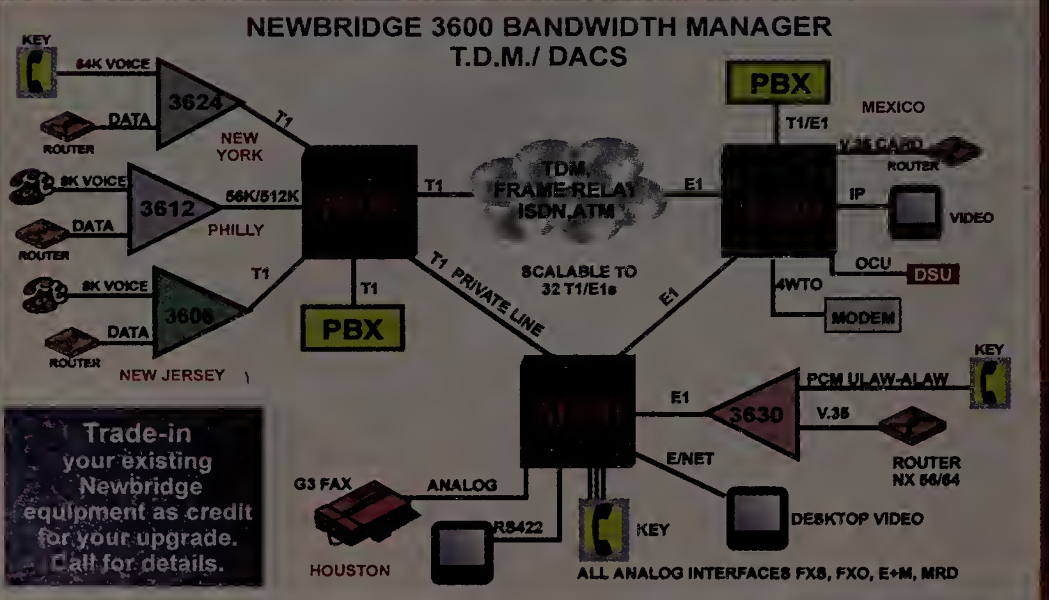

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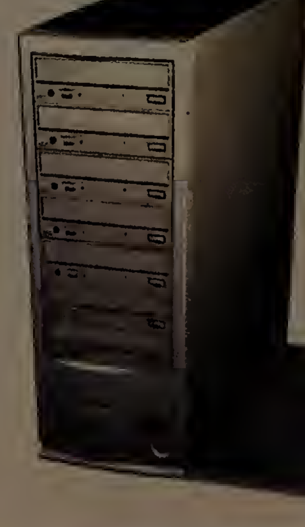

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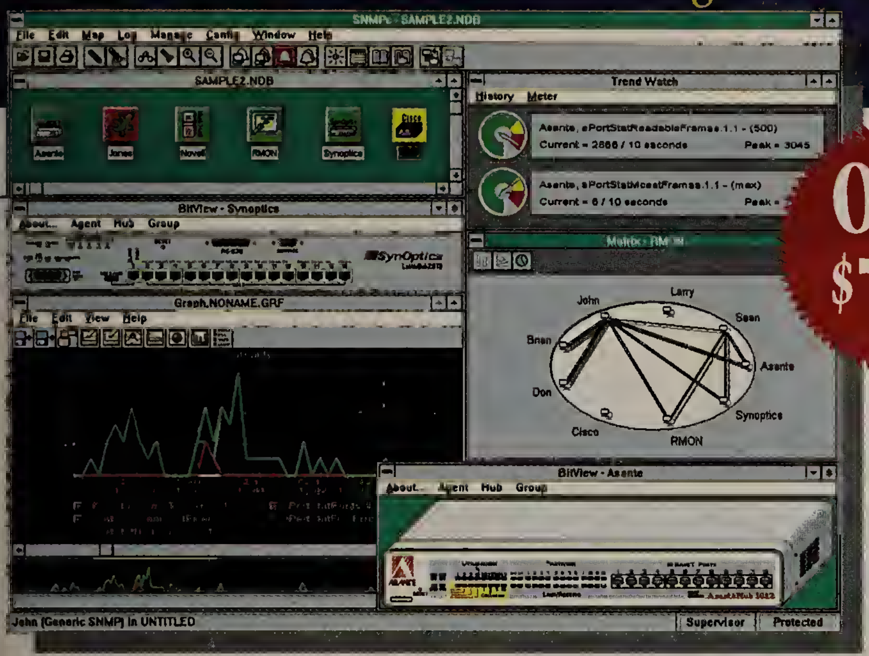

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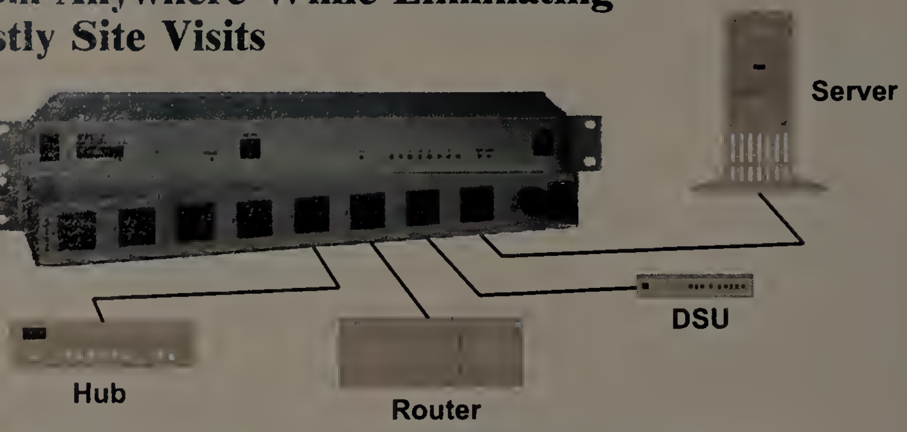

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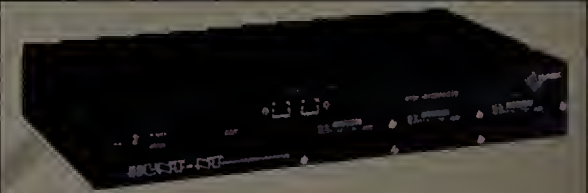

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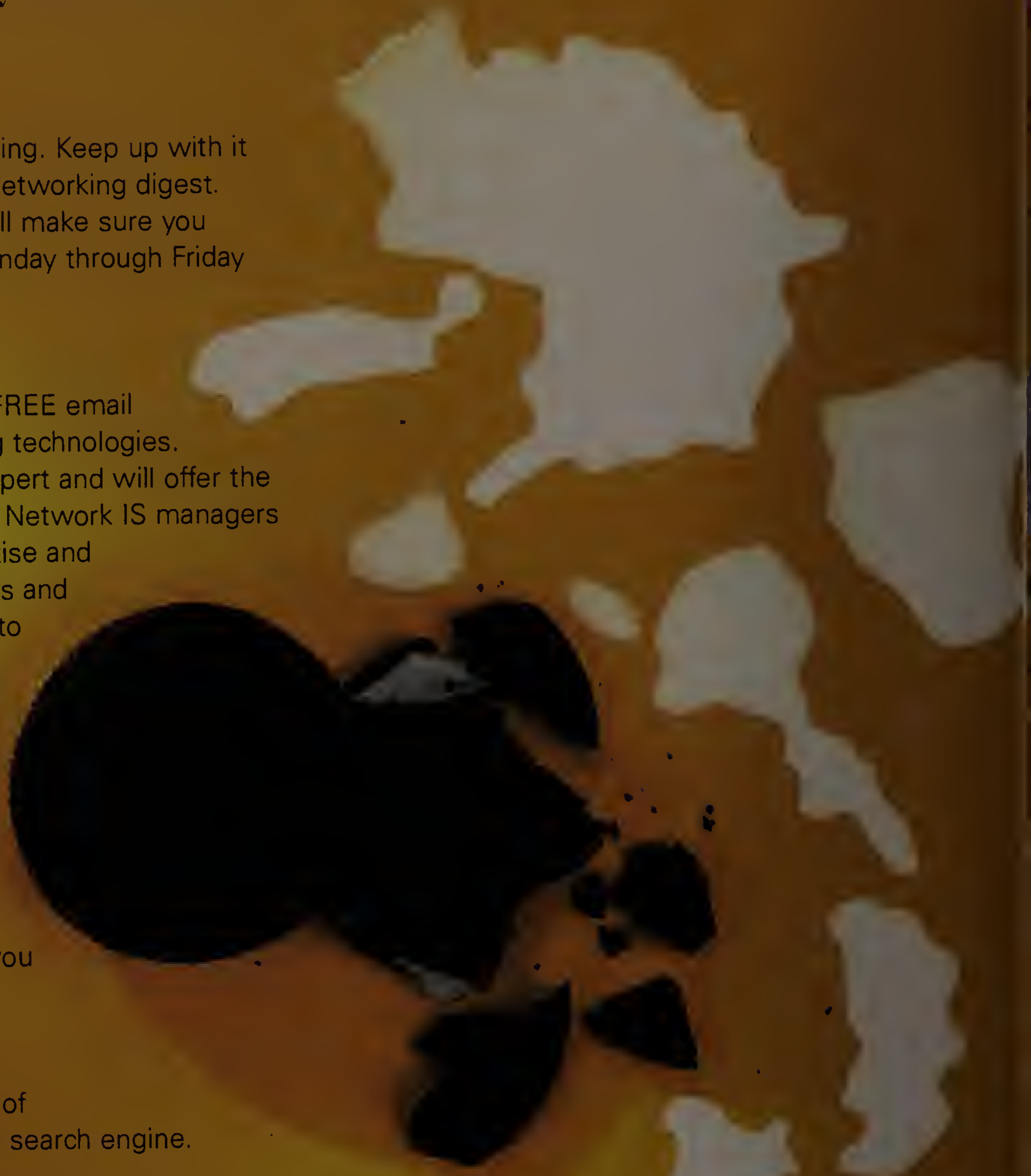

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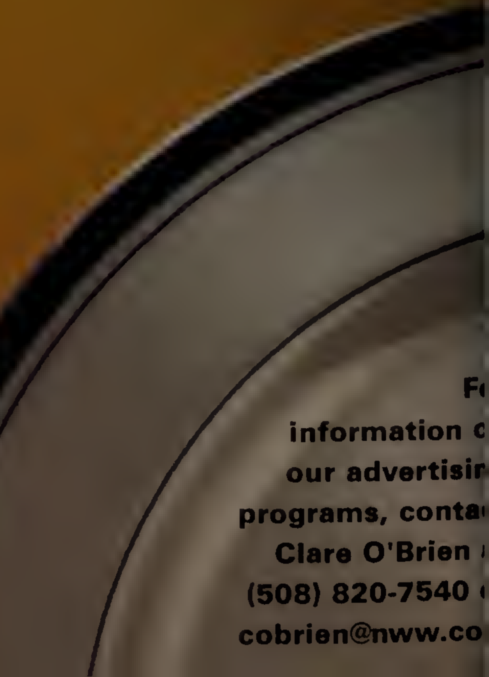

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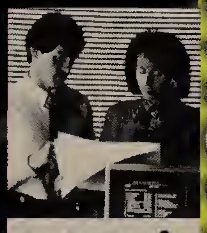

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Merrill Lynch

Continued from page 1

operational costs and to provide customers with quick access to timely market information, such as Web trading and research data.

"We're trying to promote consistency and have Merrill Lynch embrace the utility concept model" of information access and exchange, in which the network is as easy to use as other utilities, such as phone, water and electric, says Nicholas DeVito, vice president of network strategy and planning at Merrill Lynch.

STEVE BORNS

Merrill Lynch's *DeVito has faith in IP.*

"We want to align ourselves with standard Internet protocols and technologies. We anticipate leveraging the Internet going forward for electronic commerce, for Internet-based trading, for a number of possible business reasons," DeVito says.

Merrill Lynch says the network overhaul should be completed by the year 2000. The project's cost and projected savings have not been determined, DeVito says. But company officials are confident the return on investment will be worth the move.

Savings will come from replacing IBM front-end processors with less costly Cisco Systems routers, and from consolidating three separate networks and their associated operational and maintenance costs, into one network. Also, a common directory will facilitate dynamic addressing, which will ease administration.

Merrill Lynch also expects improved application performance from its IP network because applications will no longer incur the processing overhead of binding to different protocols to access information. And the common directory will help automate access and authentication routines through standard policies.

Another factor that prompted Merrill Lynch to go the all-IP route is the popularity, ubiquity and ongoing development of IP-based products.

"I don't think we have much faith in IPX going forward, or Banyan, or any other networking protocol," DeVito says. "As long as IP is the transport, we'll be positioned to compete very effectively in the marketplace."

Network specifics

Merrill Lynch's network serves 55,000 employees in 700 branches of the company's four business units: Private Client, International Private Client, Asset Management, and Corporate and Institutional Client Group.

The network is comprised of 1,800 to 2,000 Cisco Systems routers, 45% of which are Cisco 7X00-class high-end devices. The rest are Cisco 4X00 and 2500 series routers. Backbone links are E-1 and DS-3, while access links are 56K bit/sec and T-1 frame relay.

The router network is constructed in a four-tier hierarchy. The first tier is an E-1 interregional backbone that connects five global nets in a fully redundant mesh. Those regions are North America, Asia, Australia, Europe and Japan.

The second tier is made up of the regional backbones. They support DS-3 or E-1 networks that use the Open Shortest Path First (OSPF) protocol to partition each regional domain, or autonomous system, into smaller domains. An autonomous system is a collection of networks under a common administration sharing common routing capabilities.

The third and fourth tiers are OSPF areas that represent regional and remote site networks. They access the regional backbone over 56K bit/sec and T-1 frame relay links.

There are about 5,000 Ethernet and Fast Ethernet LAN segments in the Merrill Lynch network, anchored by Cisco Catalyst 5000 and 5500 Layer 2 switches. Merrill Lynch plans to give all desktops switched 100M bit/sec connections and is keeping tabs on Gigabit Ethernet technology for possible backbone deployment.

Merrill Lynch's effort will involve replacing up to 100 IBM SNA front-end processors with Cisco routers equipped with Cisco's channel interface processors. The Cisco routers will perform all TCP/IP processing, including encapsulating SNA data in IP packets and transmitting them over an IP backbone using Data Link Switching, DeVito says.

Merrill Lynch is keeping SNA intact in data centers to maintain the integrity of mission-critical SNA applications, such as CICS and IMS, but will write new applications to TCP/IP Sockets APIs, DeVito says. SNA client workstations will be outfitted with TCP/IP software and access mainframe data using tn3270 and Web browser-based 3270 terminal emulation.

"The client's got an IP stack on the PC and he's part of the enterprise, as opposed to the self-contained SNA network," DeVito says.

For quality of service (QoS), Merrill Lynch will initially employ Cisco's weighted fair queuing (WFQ) algorithm to establish priority and allocate bandwidth among users and applications. WFQ classifies

See **Merrill Lynch,** *page 52*

OUT WITH THE OLD AND IN WITH IP

Changes at Merrill Lynch as a result of moving to an IP network:

From here . . .	To there
SNA, IPX, Banyan VINES, Internet access	IP high-speed Internet limited access and service
Separate directories and bindings for each protocol and application	A single global directory repository
Static, hard-coded IP naming	Dynamic IP addressing, resource access and addressing based on user name, policies
Static, site- and business unit-specific remote access with limited scalability	Corporatewide VPN with scalable, dynamic tunneling and authentication

NYSE puts stock in Layer 3 switching

While Merrill Lynch invests in routers for its IP network, its next-door neighbor has made the leap to Layer 3 switching.

Over the next three to five years, the New York Stock Exchange (NYSE) will build a new network anchored with Bay Networks' Accelar Layer 3 switches. The switches will provide the performance boost the NYSE needs to implement a multiservice IP network capable of supporting a number of new applications. These applications include digital voice recognition for live trade and quote information, real-time interactive multimedia, broadcasting and multicasting of video to trading floor locations, and point-to-point and multipoint videoconferencing.

"We want to get more information, faster, to users on the floor," says David Bartges, director of infrastructure for the NYSE. "The name of the game is information, and we can't get enough."

Layer 3 switches will also help the Big Board handle increases in trading volume and transactions, says Andrew Bach, vice president of communication engineering planning and development for Securities Industry Automation Corp. (SIAC), the company that provides systems support to the New York and American Stock Exchanges.

Currently, the NYSE's average daily volume is 600 million shares. The current network is based on about 210 Bay Networks Backbone Concentrator Node (BCN) and Backbone Link Node (BLN) routers, and 27 dual FDDI rings with 10Base-T concentrators feeding those rings. OC-3 ATM links connect the NYSE floor network to a mirrored hot site across the East River for backup.

Each of the trading and market data terminals on the Exchange floor — there are about 3,500 in all — has a redundant Ethernet link to the network. There are about five such terminals per group, or subnet, and if a subnet goes down those terminals can be rolled over to another one in 15 to 30 seconds, Bach says.

Host computers include IBM, Tandem and Unix servers housing settlement and clearance data, and historical trading databases.

SIAC will install the Accelar switches with OC-12 or Gigabit Ethernet links between hot sites. Gigabit Ethernet backbone segments will replace the 27 FDDI rings, and each terminal will have switched 10/100M bit/sec autosensing links to the backbone.

During the transition, SIAC and the NYSE will gradually phase out the BCN and BLN routers and FDDI rings.

"FDDI has served us well, but it's time to move on," Bach says. "It was the best available technology at the time."

— *Jim Duffy*

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Dell

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customization of servers for customers itself, rather than relying on value-added resellers, Dell says it enjoys lower costs than competitors such as HP, Compaq and IBM. Dell can configure servers with customer-selected software and hardware at the factory, cutting out middlemen and their added costs.

In a briefing with *Network World* last week, executives with Dell's Enterprise Systems Group said their goal is to drive down server prices and profit margins. That will put a crimp in the strategies of PC rivals who use high server margins to subsidize desktop operations, says Tejas Vakil, a former Compaq manager who is now Dell's vice president of marketing for the Americas.

Vakil says Dell, with annual revenue of $13.6 billion, intends to make "commodity" a respectable word in the enterprise market.

"What we want to be is a full-service computer system provider to the corporate world," adds Joe Marengi, senior vice president and general manager of the customer relationship group at Dell. "We've made big progress and we're just going to continue."

Dell's offering to America's top companies will span the gamut — from low-cost workgroup servers all the way up to the largest SMP boxes arrayed in clusters. Additionally, Dell is trying to bolster its service offerings by initiating partnerships with system integrators such as Wang and Unisys.

"They believe if they can undersell or cut their competitors' server margins, they'll take away their advantage," says Amir Ahari, analyst with Framingham, Mass.-based consultancy International Data Corp. (IDC).

Competitors, though, think Dell's strategy can only take it so far in the enterprise. Compaq executives say Dell will never succeed in winning over the biggest enterprise customers without a better portfolio of service and support offerings. Compaq's recent acquisition of Digital was fueled in large part by its desire for Digital's large service staff, which is accustomed to supporting complex networks.

Dell contends its partnerships with service providers are more than adequate for handling even the biggest customers, and executives say Compaq is turning to pricey support services to make up for the margins being lost on desktops and servers.

Getting remote

During the briefing, Dell executives offered a peek at some of the products the company is about to roll out. Most significantly, Dell plans to offer PCI cards co-developed with an unnamed partner that enable customers to use its PowerEdge servers as remote access devices supporting ISDN Basic Rate Interface and Primary Rate Interface access.

Users can configure the servers with up to two cards to expand capacity. Two BRI cards will support up to 16 connections, while two PRIs will provide up to 46 connections.

Dell is taking advantage of the Routing and Remote Access Service capabilities offered by Microsoft in Windows NT. Matt Maupin, a Dell product manager for servers, says the company believes Windows NT-based systems will account for as much as 50% of the remote access market in the near future.

Dell's remote access offerings will be aimed at small to mid-size businesses. The company does not intend to poach in the high-end remote access market served by companies such as Compaq's Microcom subsidiary, Cisco and Shiva.

Maupin says Dell's servers can be used in VPN configurations but do not have to be dedicated to remote access functions. Sources said network managers will be able to remotely manage and configure the systems.

One Dell customer says the planned remote access offering wouldn't fit into his sprawling enterprise network, which supports 43,000 end users, but might find a receptive audience among other network professionals. "It would appeal to small businesses and workgroups starting small call center applications," says Lorin Olsen, senior manager of groupware and e-mail services at Sprint.

Maupin said Dell chose to work with ISDN — with its tarnished reputation — rather than digital subscriber line technology because DSL is aimed more at consumers than businesses.

In addition to new remote access offerings, Dell officials say the company will support the eight-way server architecture from Intel and is also working with Intel to offer the 64-bit Merced and McKinley chips as they become available.

To showcase the growing power of its NT systems, Dell plans in the next month or so to stage a demonstration of a 16-node server cluster running high-end database applications. The company plans to bring some type of high-end server cluster product to market in the next year; it currently offers Microsoft Cluster Server for two-node failover functions.

Recognizing the importance of Gigabit Ethernet connections in the server arena, Dell later this year will begin marketing Gigabit Ethernet adapters for the PowerEdges. The company declined to discuss which adapter maker will supply the technology. Dell currently offers Intel's 10/100M bit/sec Ethernet adapters.

Working with Data General, Dell has also announced the PowerVault line of Fibre Channel-attached storage devices for its servers.

Dell is doing a creditable job trying to address the shortcomings in its product offering, even if the company is doing it in its own sweet time, IDC's Ahari says. "They need to diversify, and they're addressing this . . . slowly," Ahari says. "They need to offer a little bit more to get at the data center accounts." ■

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"We came from nowhere to become a significant player in the server market, and we'll just keep going. We want the customer to experience the best buying relationship that's possible."

Joe Marengi, senior vice president and manager of Dell's customer relations group

Merrill Lynch

Continued from page 51

traffic into conversations and applies priority — or weights — to traffic to determine how much bandwidth each conversation is allowed relative to other conversations.

But Merrill Lynch still needs to formulate a long-term QoS strategy, DeVito admits.

NetWare and VINES packages, meanwhile, handle less mission-critical tasks, such as file and print services. The Banyan conversion to IP is 99% complete, and the NetWare transition is currently under way, says Alok Kapoor, vice president of enterprise architecture at Merrill Lynch.

Merrill Lynch may opt for NetWare-to-IP gateways rather than a wholesale change, due to cost and complexity considerations, Kapoor says.

One of those considerations is directories. The different networks and applications in the Merrill Lynch network mean separate and distinct directories are also present.

Merrill Lynch's Windows NT domains have an exclusive directory, 15% to 20% of its employees use Novell Directory Service, and there are some home-grown directories for customized applications, Kapoor says.

And then there's Merrill Lynch's IP Domain Name System (DNS).

"We have a pretty messed-up DNS environment right now," Kapoor says. Merrill Lynch users are currently logged by their hard-coded IP addresses, which limits mobility and flexibility. If a user moved to another workstation that had a different IP address, it would be hard to ensure that the user had access to the resources he or she needs.

"We're a largely static IP environment, and that makes manageability a nightmare when you consider the moves, adds and changes that occur," Kapoor says. "It takes an immense effort today to move a node from point A to point B and have all of your applications continue to function."

Alok Kapoor *discusses conversion milestones.*

PHOTOS: STEVE BORNS

A common directory

Merrill Lynch is looking to consolidate these separate directories into a single, global repository to better align users with the resources and applications they need, and to provide single sign-on access. The directory would log users by name instead of IP address.

This would enable Merrill Lynch to implement Dynamic Host Configuration Protocol (DHCP) addressing, in which users lease an IP address from a pool of addresses and give it back when they're done, Kapoor says. DHCP is intended to enhance mobility in an IP network.

A common directory would facilitate an intelligent network that uses policies to grant access to network and application resources to specific users or groups of users. Merrill Lynch is encouraging Cisco to work more closely with Microsoft on aligning Cisco equipment and CiscoAssure policy software with Microsoft's Active Directory and applications such as Exchange, Kapoor says.

Cisco and Microsoft are already working together on the Directory Enabled Network initiative, which is attempting to standardize directory schemas and access routines for policy-based networking.

For remote access, Merrill Lynch is looking at implementing a virtual private network using a common tunneling protocol for encryption, Kapoor says. Currently, Merrill Lynch is using the Point-to-Point Tunneling Protocol in Windows 95 and NT, but would like to implement a more scalable system some time in 2000, he says. ■

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Backspin

Making spam work for us

On Aug. 6, H.R.3888 — a bill entitled the "Anti-slamming Amendments Act" —was sent to the U.S. House of Representatives, where it is expected to pass into law. The bill is a typical legislative pot-pourri combining sundry topics such as the slamming of telephone accounts, surety bonds for switchless resellers and spamming. The latter is what interests me.

Mark Gibbs

Spam is one of those curious things that gets people fired up out of all proportion to the issue. I know, I know, some of you would say I'd feel differently if I were getting a few hundred junk e-mails a day, as some of you apparently do.

But just as we accept that we'll be the target of junk mail, unsolicited bulk snail-mail (UBS), we have to accept the same situation online — unsolicited bulk e-mail (UBE). It is unavoidable.

Now I occasionally get an interesting UBE. It concerns something I want to know about, which raises the issue of what is acceptable. Most of us don't want to receive invitations to peruse "XXX teenage slut action," but how about a coupon for a dollar off your next pizza? Sure.

Is a begging letter from a charity unacceptable? Not really. Will an invitation from a car manufacturer to test drive its latest vehicle drive you into a rage? It shouldn't. Not unless it's a Yugo. But I digress. . . .

These are not the same as the porno and get-rich-quick offers that are the bane of current bulk e-mail. But respectable UBE will eventually become a routine staple of your in-box, given that real-world costs for direct mail marketing have gone through the roof in the past few years.

And let's be clear, many reputable companies already use UBE — Microsoft and BellSouth, for example (they are reputable, aren't they?).

The reason I started looking at spam legislation was a note I received from faithful reader Mike Topalovich. He asked what Section 301 in the following portion of a UBE referred to: "This is a responsible e-mail being sent by K.M.A./Webmole. The above statement complies with Section 301 requirements relating to transmissions of unsolicited commercial electronic mail."

I found that Section 301 is part of Title III of a Senate bill, also called the "Anti-slamming Amendments Act." And the people who sent this UBE, Kestern Communications Group, are in compliance with this bill. It requires that those distributing UBE identify themselves and remove addresses from their distribution lists on request. If spammers ignore these and other provisions in the act, they could be liable for fines up to $30,000 for each offense.

I called Kestern, and the company appears to be a responsible outfit. It has strict rules on content and does not allow porno.

One thing you'll find in the subject line of any Kestern UBE is the string "ADV:" — which makes it very easy to filter out the company's transmissions. I like this; it makes sense.

Moreover, I hope lawmakers grab on to the idea of tags. If we make it illegal to send out UBE without such a tag, filtering becomes easy.

What about the stuff you might want? Require a Multi-purpose Internet Mail Extensions addition to such messages that contains an Extensible Markup Language description of the contents. Make misrepresentation or the failure to use the ADV flag a very serious offense.

We have to accept that spam isn't going away. Rather than doing the impossible — trying to ban it altogether — let's use the technologies we have to make it useful.

Solicited responses to nwcolumn@gibbs.com or on (800) 622-1108, Ext. 7504.

'NET BUZZ

The latest on the Internet/intranet industry

BAD USER INTERFACES AREN'T MY BAG, BABY! Think **Austin Powers** as an intense techie — but with blond hair and better teeth — and you get a good picture of **Jakob Nielsen.**

Until recently the Denmark native was a distinguished engineer at **Sun,** where he focused on improving user interfaces.

Nielsen left the Sun orbit in July, taking with him his long, scruffy sideburns, blazingly bright shirts and a fervent desire to save the world from the evils of poorly designed Web sites.

Along with former **Apple Vice President Donald Norman,** Nielsen has just started a consulting firm dedicated to, among other things, helping companies make their Web sites more user-friendly.

Nielsen sees no shortage of potential customers for the Atherton, Calif.-based **Nielsen Norman Group.** "My estimate is that at least 90% of all commercial Web sites are overly difficult to use," he says.

Among the most common and egregious Web design crimes cited by Nielsen:

- Graphics-intensive pages that take forever to download.
- Sites that include lots of product hype and little real information.
- Disorganized sites that users have a difficult time navigating.
- Long scrolling text. While fine for print and linear reading, it's all wrong for online users, who scan more than they read.

Chris Nerney

However, it is when the subject of frames comes up that Nielsen truly becomes one tortured Dane.

"Frames suck," he says. "Splitting a page into frames is very confusing for users because frames don't correspond with the rest of the Web, which is based on pages, not frames. All of a sudden, you cannot bookmark the current page and return to it, URLs stop working, and printouts become difficult."

Nielsen's prescription for improving the user experience is to avoid untested bleeding edge technology, go easy on graphics, and think through a Web site's design from a customer's perspective.

"Simplicity," he says, "is the goal." His new company's Web site — and an admirably spartan one it is — can be found at www.nngroup.com.

SCOTT MCNEALY'S DREAM COMES TRUE What's a four-letter word that quickens the pulse of **Scott McNealy?** Well, yeah, there's that. But long before Java launched his career as a trade-show comedian, the **Sun** CEO developed an unhealthy passion for golf.

Unhealthy, you ask? Hey, the guy sports a 6 handicap; he can't be in the office all that much. (Actually, I heard it's a 1 handicap. I'm just trying to smoke him out for an interview he's been dodging.)

Come September, thanks to a joint venture between **PGA of America** and **IBM,** McNealy can satisfy his golf fix from behind his cobweb-shrouded desk by visiting the official Web site for the 80th PGA Championship at www.98PGA.com.

Using a PC mouse and IBM's Internet media technology, McNealy and anybody else can take a Java-based, 3-D virtual tour of **Sahalee Country Club** in Redmond, Wash., and experience the course as the players do.

INVESTORS SPOT NETBUY $4.1 MILLION A start-up that runs an online purchasing site for electronic components has closed a second-round funding deal for $4.1 million. **NetBuy Corp.,** based in Santa Clara, Calif., now has more than $7 million in venture funding since its founding two years ago. First-round investors **Amdahl Corp.,** the **Euro-America Group** and the **Sprout Group,** a venture arm of **Donaldson, Lufkin & Jenrette,** were joined by **Advent International** in the recent funding deal.

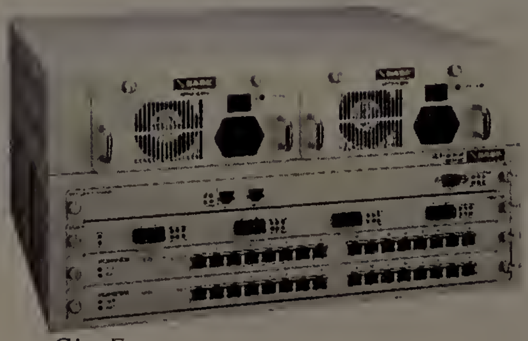
NetBuy combines the inventories of hundreds of electronics components distributors into one Web site, creating a "spot" market that allows the buying and selling of components in real time. The site is located at www.netbuy.com.

'Net Buzz may lack the "cat threads" of Jakob Nielsen, but when it comes to the latest Internet- and intranet-related news, this is the place to swing, baby! Send your grooviest tidbits and gossip to Chris Nerney at cnerney@nww.com or (508) 820-7451.

An Unfair Advantage?

NBase is the fourth largest manufacturer of workgroup Ethernet switches. We're not the biggest, just the best.

NBase has a history of industry milestones (delivered to you directly or through our OEM customers):



GigaFrame Routing Switch

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- First 10/100 auto-negotiating switch
- First worldwide Gigabit Ethernet installations
- First Gigabit transmission to distances of 65 miles
- Longest Gigabit transmission distances in the world (150 miles and beyond)

We combine our world class switching capabilities with our leadership in high speed optical technology to develop and deliver an unfair advantage.

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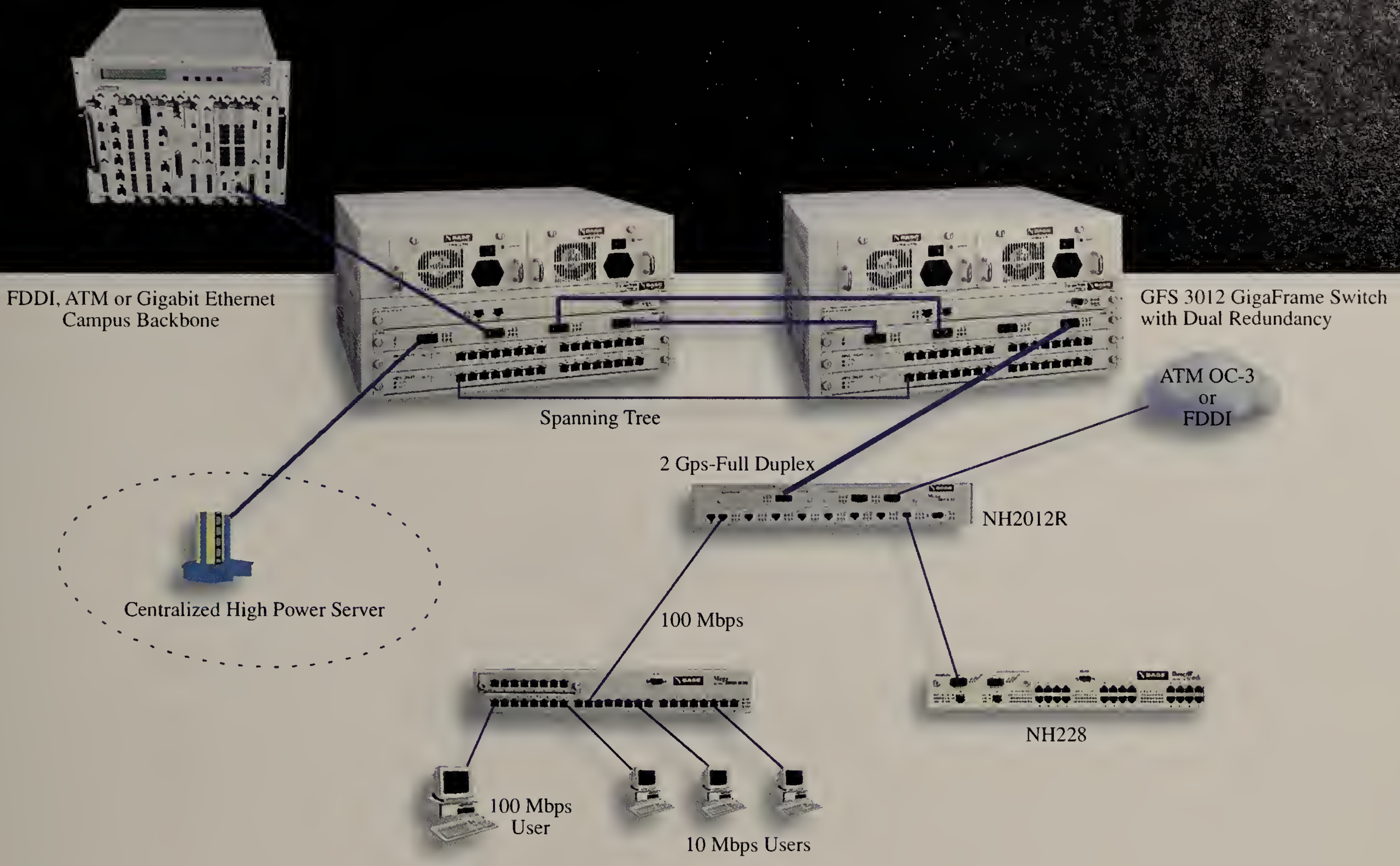

- A Complete Family of Networking Products
- Wide Range of Port Densities (2 to 196 ports) and Speeds (10/100/1000 Mbps)
- Transmission Distances up to 150 Miles
- ATM and FDDI Connectivity
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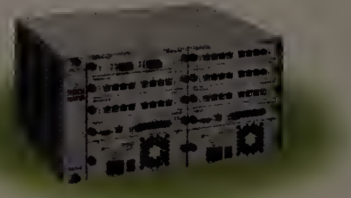
SMART NETWORKING

SmartSwitch Router

Layer 2, 3 and 4 switching with application-level control



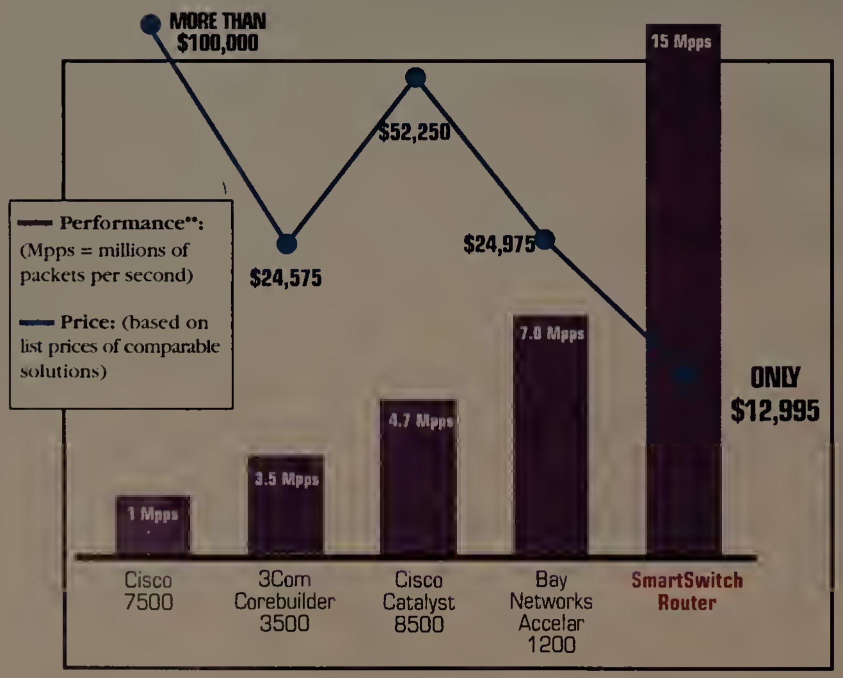
Smart Performance

Up to 15 times faster than competitive products

Smart Price

More than 50% off list price—as much as 75% less than comparable solutions

$12,995*



The SmartSwitch Router— A SmartPackage Solution For Growing Networks

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CABLETRON SYSTEMS

*Package price includes 8-slot chassis, power supply, control module, two 8-port 10/100 TX modules, router and management software. Limited time, limited quantity. Limit one per order.

**Based on independently published benchmark performance data.

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